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PROPERTY OF
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3924 MEADE ST.
DENVER, COLORADO

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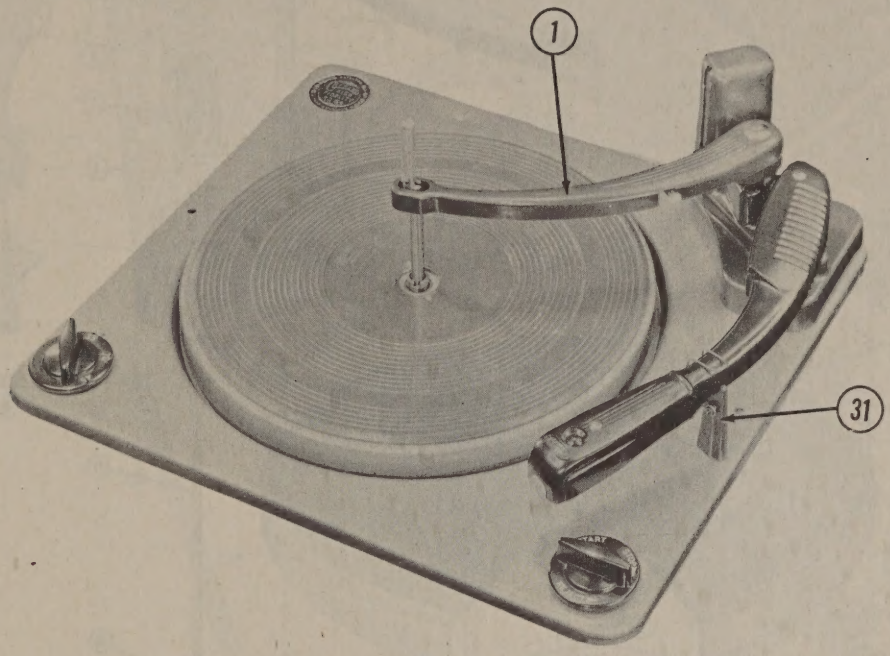
SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 6 IN SET 285.

COLLARO MODEL RC-54 WAS COVERED IN PHOTOFACT FOLDER 6 - SET 285.



PRODUCTION CHANGES
BULLETIN 153

PRODUCTION CHANGES
BULLETIN 153

COLLARO MODEL RC-54, MARK II

This service manual supplement contains information on the Collaro RC-54, Mark II Record Changer. All changers manufactured after serial number 300,001 are known as Mark II units. For complete service information, this supplement should be used in conjunction with Photofact Folder 6 - Set 285.

RECORD CHANGER DIFFERENCES

1. The record balancing arm (1) has been redesigned and a metal clip added by which the arm can be lifted without binding at any point.

2. The rest post and lock assembly (31) has been changed. This assembly permits the pickup arm to be more securely fastened during transport or when the unit is not in use. The lock assembly (31) should be disengaged from the pick-up arm before the changer is operated.

3. Switch-off lever (74) has been added and provides a more positive shut-off operation. On changers using switch-off lever (74), note that the peg on top of operating bar (107) has been removed.

4. Parts (96), (97), (98), and (98A) have been added to ensure accurate positioning of the pick-up arm. If the pick-up arm set-down positions are erratic, the following procedures should be followed:

Check for weakening or displacement of spring (96) or incorrect adjustment of nut (98A). Adjust as follows:

A. Allow changer to shut off automatically, and clip the pick-up arm to its rest.

B. Pressing rear end of pick-up arm gently downwards, adjust nut (98A) so that the pressure lever (97) just ceases to exert any pressure on the shoulder of brass sleeve (94).

NOTE: When correctly adjusted, the full pressure of spring (96) is transmitted to the felt friction disc (24) during the change cycle, giving adequate frictional control to ensure accurate positioning of the pick-up arm. This friction must, however, be completely released at the end of the change cycle so that the stylus is not prevented from freely following the playing grooves of the record. This is most important to avoid tracking failure and excessive wear of stylus and records.

The position at which the stylus alights on a record may be adjusted, if necessary, as described in the original service manual.

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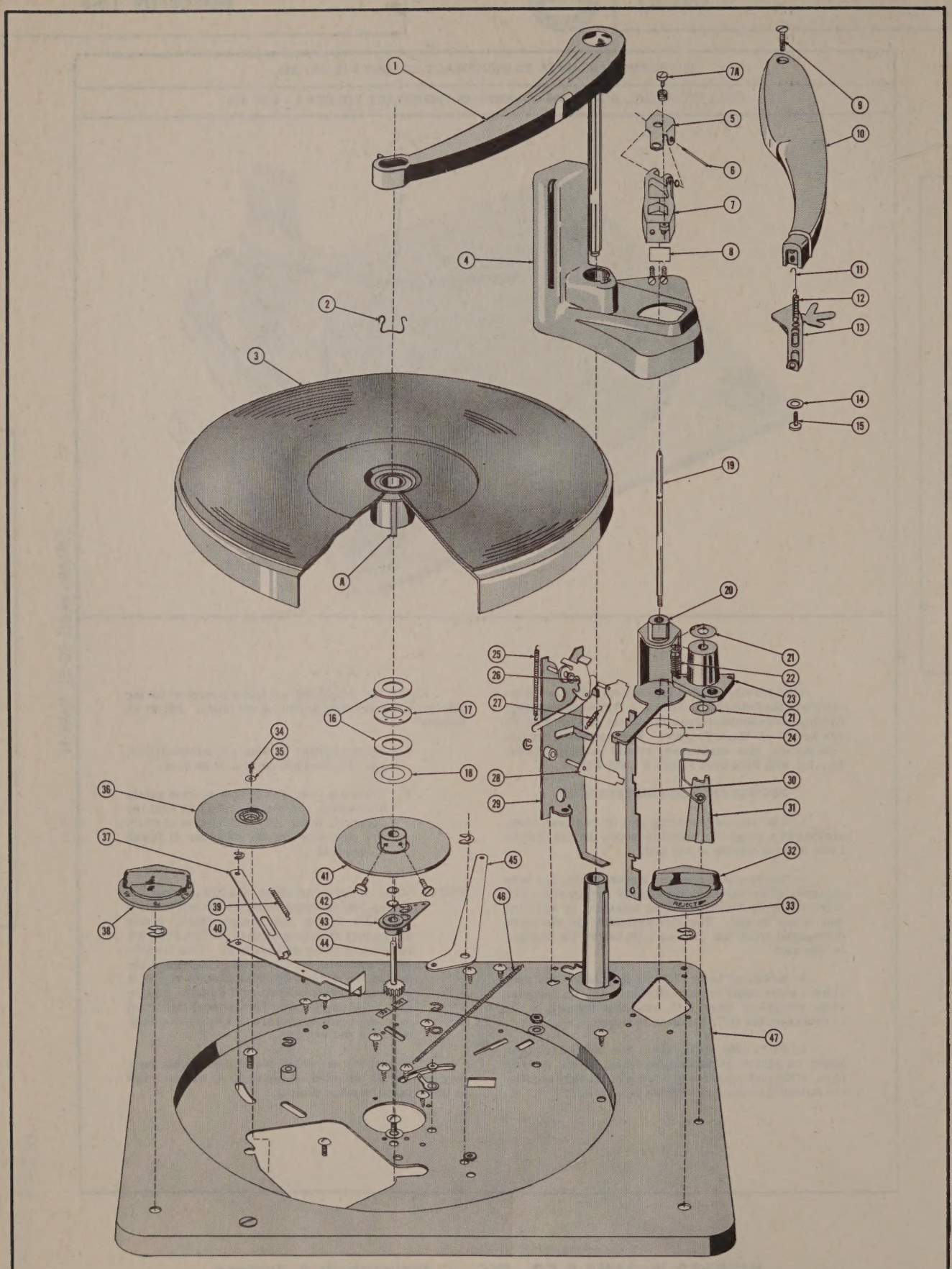

A PHOTOFACT "EXPLODED" VIEW
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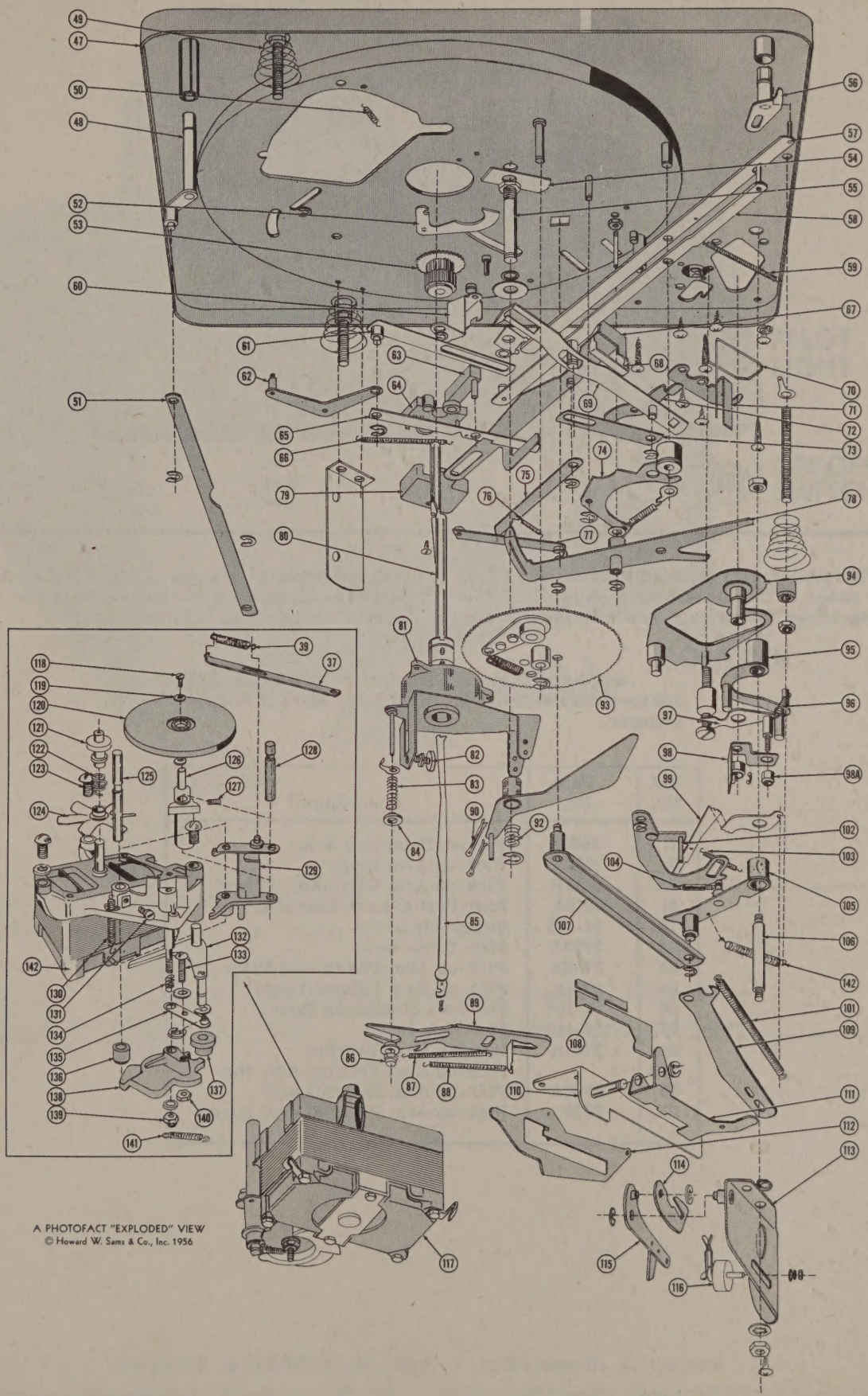
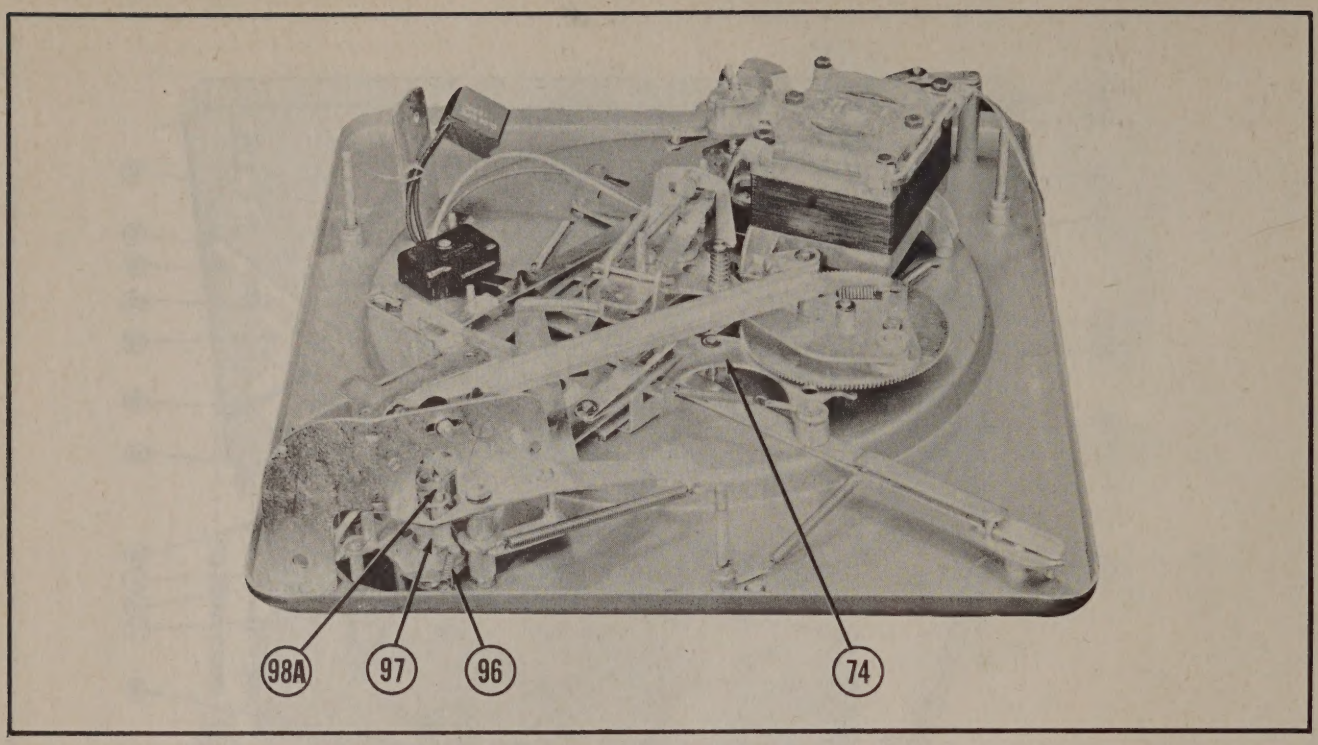
EXPLODED VIEW OF PARTS ABOVE BASEPLATE



EXPLODED VIEW OF PARTS BELOW BASEPLATE

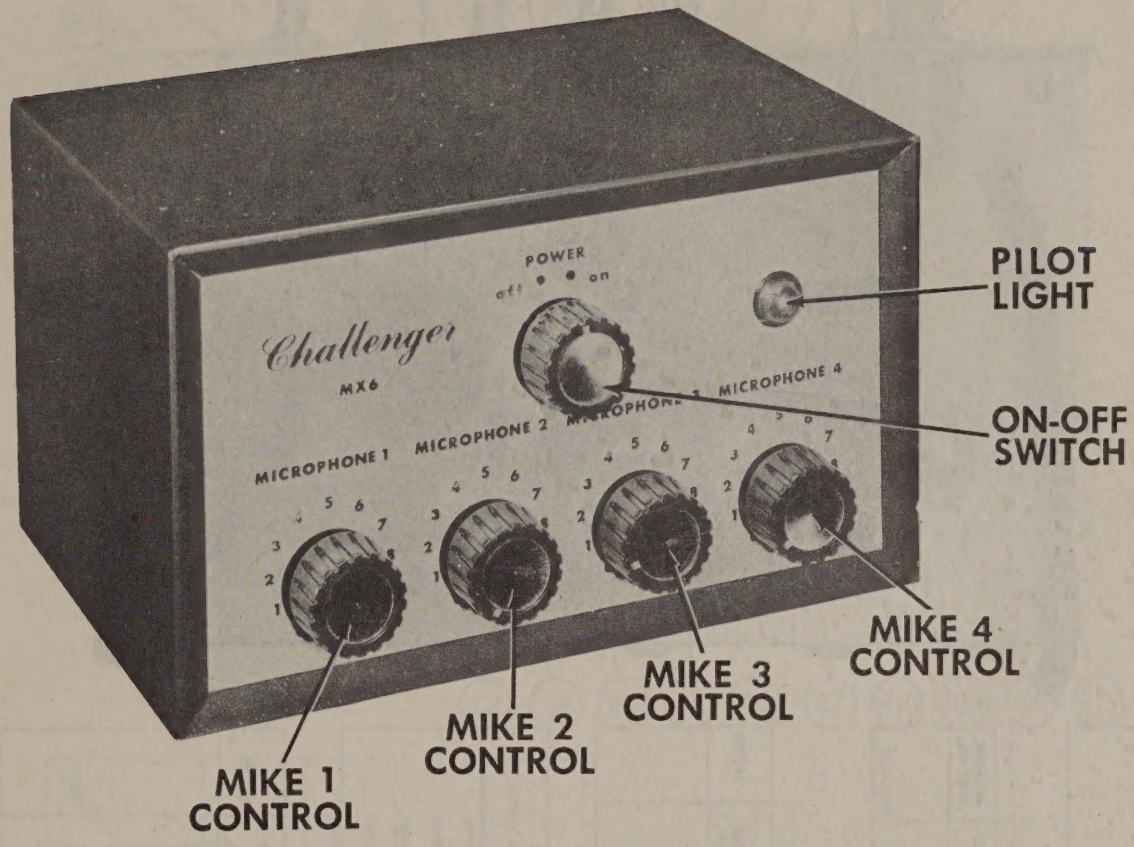


5. The pick-up arm depth adjustment screw (7A) has been added to the pick-up arm hinge (7). This screw determines the depth to which the pick-up arm will fall when the changer is out of cycle. Adjustment should be made so that the pick-up head (not the stylus) comes level with the turntable mat.

Use the parts list in Photofact Folder 6 - Set 285 and the parts list below for the RC-54, Mark II Record Changer.

Ref. No.	Part No.	Description
1	3680A	Record Balancing Arm
7	1993A	Pick-up Arm Hinge
7A	1993B	Pick-up Arm Depth Adj. Screw
31	3818A	Rest Post & Lock Assembly
74	54-143	Switch-off Lever
93	3723A	Main Drive Gear
94	3748A	Pick-up Arm Positioning Plate
95	3741A	Pick-up Arm Lateral Lever
96	54-144	Set-down Stabilizing Spring
97	54-145	Pressure Lever
98	3747A	Lift Pin Mtg. Bracket
98A		Pick-up Arm Friction Adj. Nut
99	3580A	Pick-up Arm Return Lever
101	3738	Pick-up Arm Return Lever Spring

CHALLENGER
MODEL MX6



CHALLENGER
MODEL MX6

TRADE NAME	Challenger Model MX6
MANUFACTURER	David Bogen Co., Inc., 29 Ninth Ave., New York 14, N. Y.
TYPE SET	AC Operated 5 Channel Audio Amplifier
TUBES (Three)	Types 12AX7 Preamplifier, 12AX7 Preamplifier, 12AT7 AF Amplifier - Cathode Follower
POWER SUPPLY	110-120 Volts AC - 60 Cycles RATING .11 Amp. @117 Volts AC

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PARTS LIST AND DESCRIPTIONS

CHALLENGER
MODEL MX6

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	REPLACEMENT DATA		NOTES
		CHALLENGER PART No.	STANDARD REPLACEMENT	
V1	Preamplifier	12AX7	12AX7	
V2	Preamplifier	12AX7	12AX7	
V3	AF Amplifier – Cathode Follower	12AT7	12AT7	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	CHALLENGER PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	■40	150		AFH3-09	C008		TM-403020-150	T-040	
B	▲30	150							
C	10	150							
C2	100	25		PRS25V100	BRH251	TC 2501	TD-100-25	MTH-2510	TVA-1207

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	CHALLENGER PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C3	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C4	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C5	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C6	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C7	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C8	.1	200		P288N-1	DF-104	CUB2P1		PT401	2TM-P1	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	CHALLENGER PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500KΩ	½	V340B	B-60	A47-500K-Z	Q13-133	U-48	Microphone #1 Level
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R1A
R2A	500KΩ	½	V340B	B-60	A47-500K-Z	Q13-133	U-48	Microphone #2 Level
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R2A
R3A	500KΩ	½	V340B	B-60	A47-500K-Z	Q13-133	U-48	Microphone #3 Level
B	Shaft		Not Req.	Not Req.	FSK-1/4	Not Req.	Not Req.	Attach to R3A
R4A	500KΩ	½	V340B	B-60	A47-500K-Z	Q13-133	U-48	Microphone #4 Level
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R4A

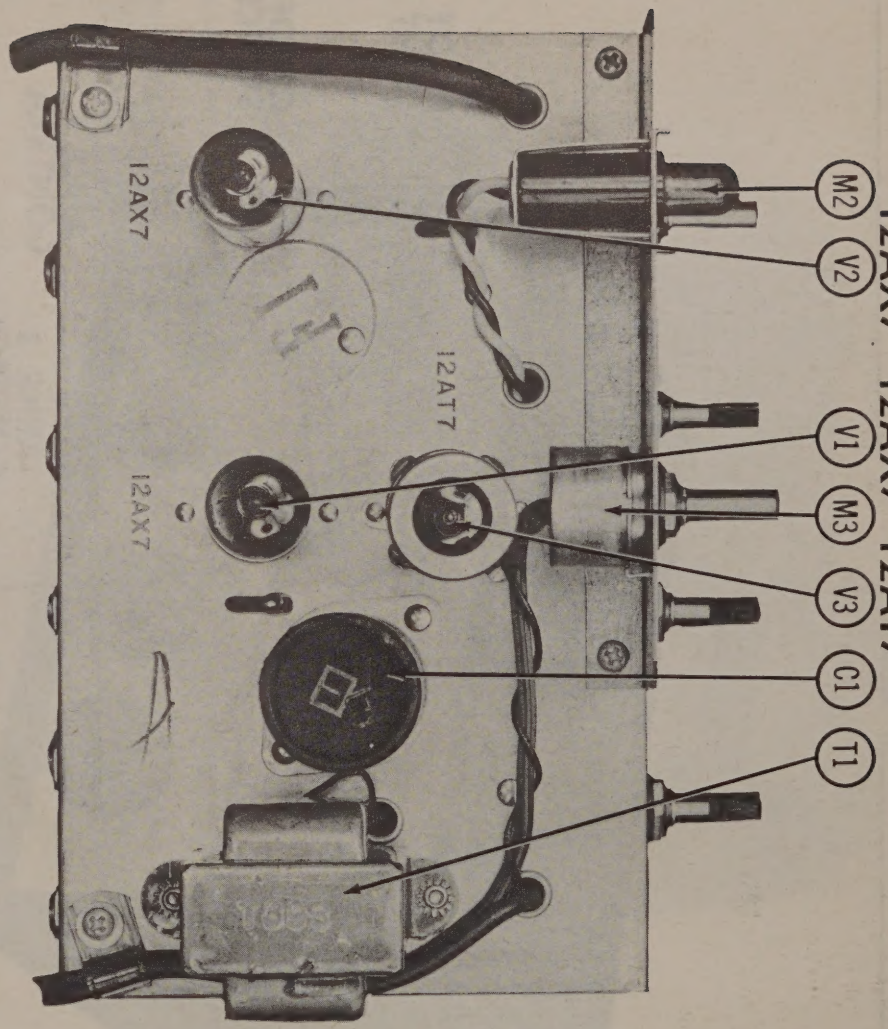
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	CHALLENGER PART No.	IRC PART No.	
R5	470KΩ	½		BTS-470K	
R6	100KΩ	½		BTS-100K	
R7	1000Ω	½		BTS-1000	
R8	470KΩ	½		BTS-470K	
R9	100KΩ	½		BTS-100K	
R10	470KΩ	½		BTS-470K	
R11	100KΩ	½		BTS-100K	
R12	470KΩ	½		BTS-470K	
R13	100KΩ	½		BTS-100K	
R14	470KΩ	½		BTS-470K	
R15	470KΩ	½		BTS-470K	
R16	470KΩ	½		BTS-470K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	CHALLENGER PART No.	IRC PART No.	
R17	470KΩ	½		BTS-470K	
R18	270KΩ	½		BTS-270K	
R19	3300Ω	½		BTS-3300	
R20	1Meg	½		BTS-1Meg	
R21	1000Ω	½		BTS-1000	
R22	22KΩ	½		BTS-22K	
R23	100KΩ	½		BTS-100K	
R24	68KΩ	½		BTS-68K	
R25	4700Ω	½		BTS-4700	Note 1
R26	4700Ω	½		BTS-4700	
R27	2700Ω	1		BTA-2700	
R28	47Ω	½		BTS-47	
R29	47Ω	½		BTS-47	

Note 1. Some versions use a 47KΩ, 1/2 watt resistor in this application.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	CHALLENGER PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @.11A	115V CT @.0036A Tap @ 6.3VAC @.475A				P9100	P3046①	PS8415	26R32	

①Tape 6.3VCT.

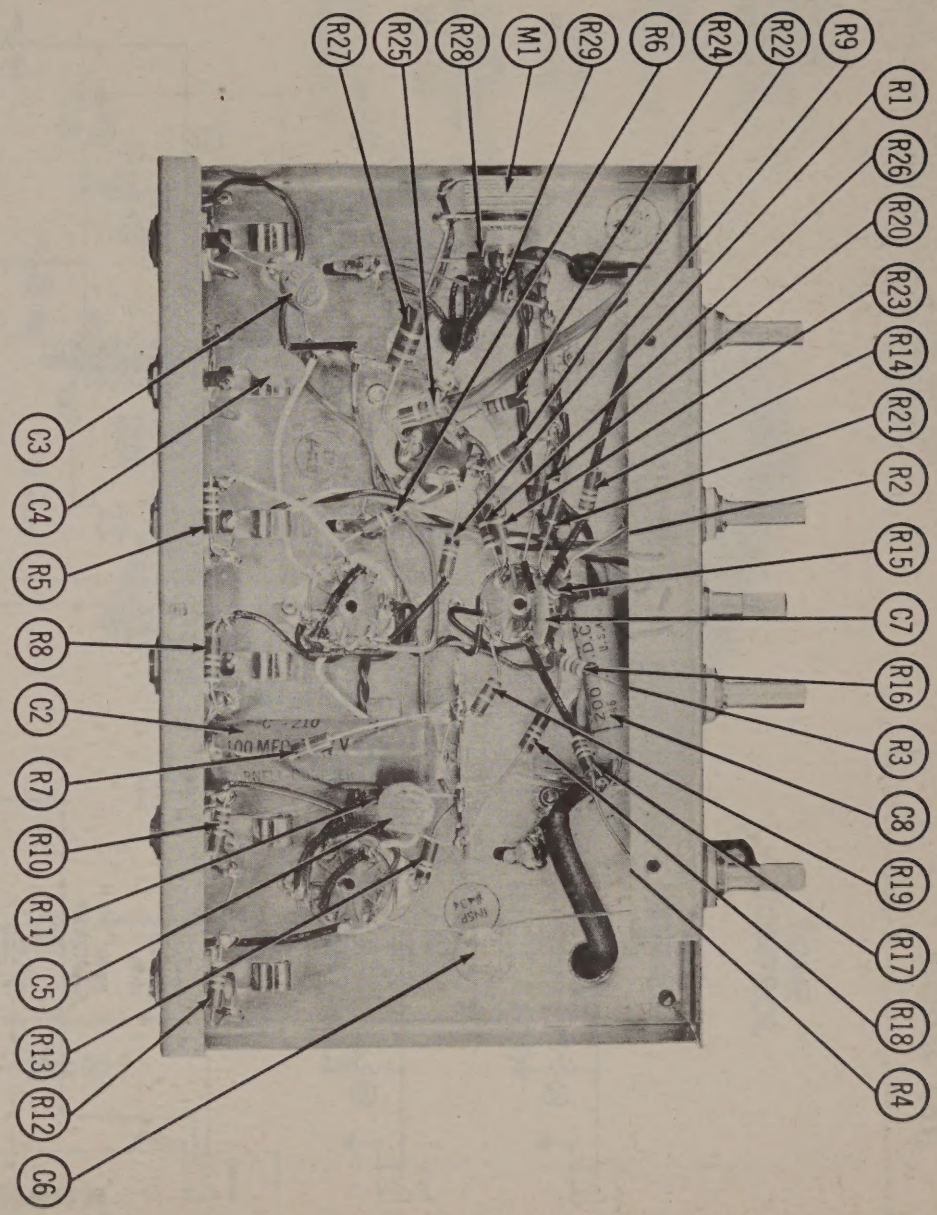
SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	CHALLENGER PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.0036ADC		1159	CR20	8S35	8Y1	50	

MISCELLANEOUS

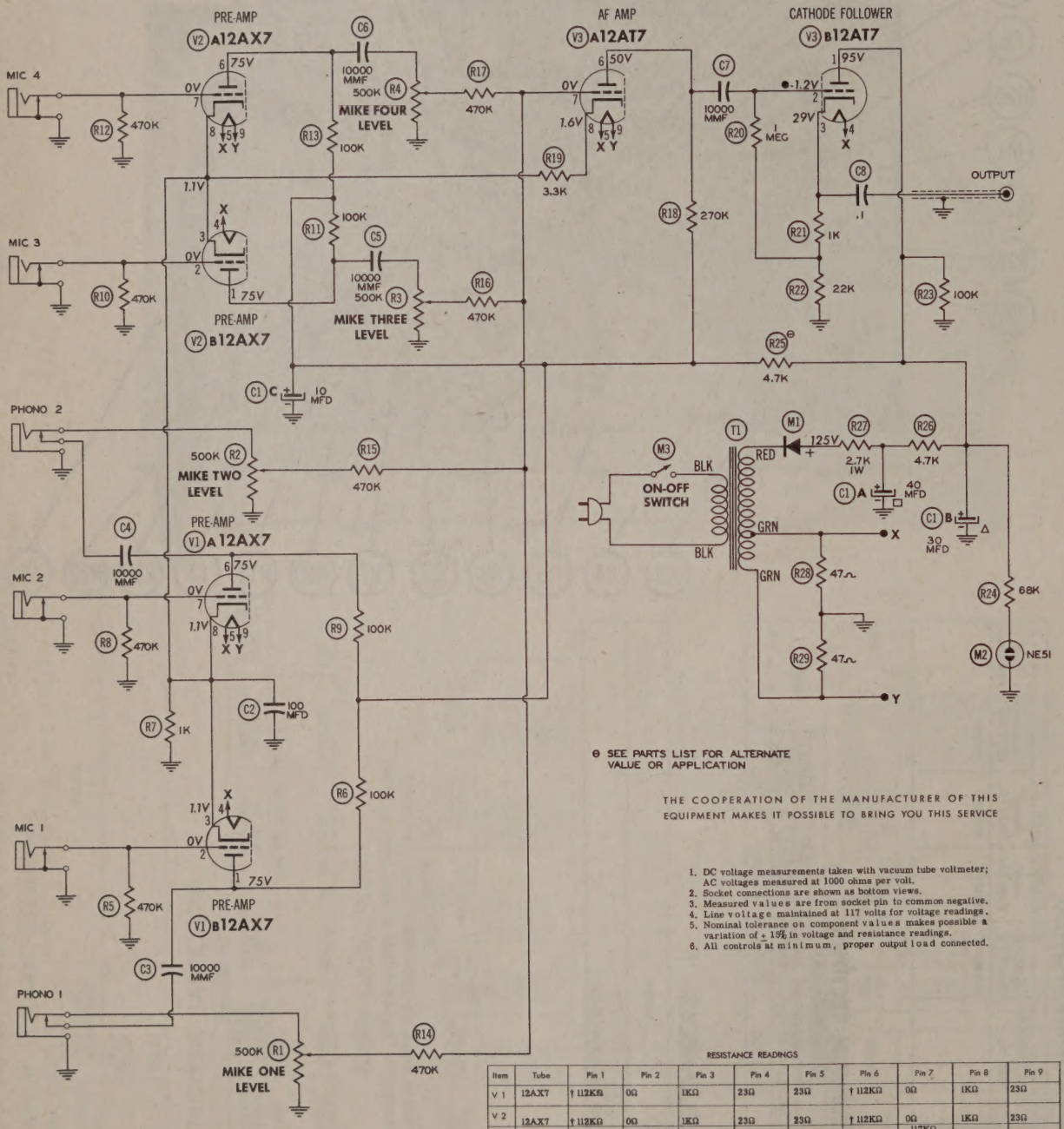
ITEM No.	PART NAME	CHALLENGER PART No.	NOTES
M2	Pilot Light		#NE51
M3	Switch	S389	On-Off (Power) SPST

CHASSIS—BOTTOM VIEW



CHALLENGER MODEL MX6

CHALLENGER MODEL MX6



⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AX7	† 112KΩ	0Ω	1KΩ	23Ω	23Ω	† 112KΩ	0Ω	1KΩ	23Ω
V 2	12AX7	† 112KΩ	0Ω	1KΩ	23Ω	23Ω	† 112KΩ	0Ω	1KΩ	23Ω
V 3	12AT7	† 7.4KΩ	1Meg	23KΩ	23Ω	23Ω	† 282KΩ	117KΩ *242KΩ	4.3KΩ	23Ω

† MEASURED FROM OUTPUT OF M1.
* ALL CONTROLS SET AT MAXIMUM. MEASURED FROM PIN 3 OF V3.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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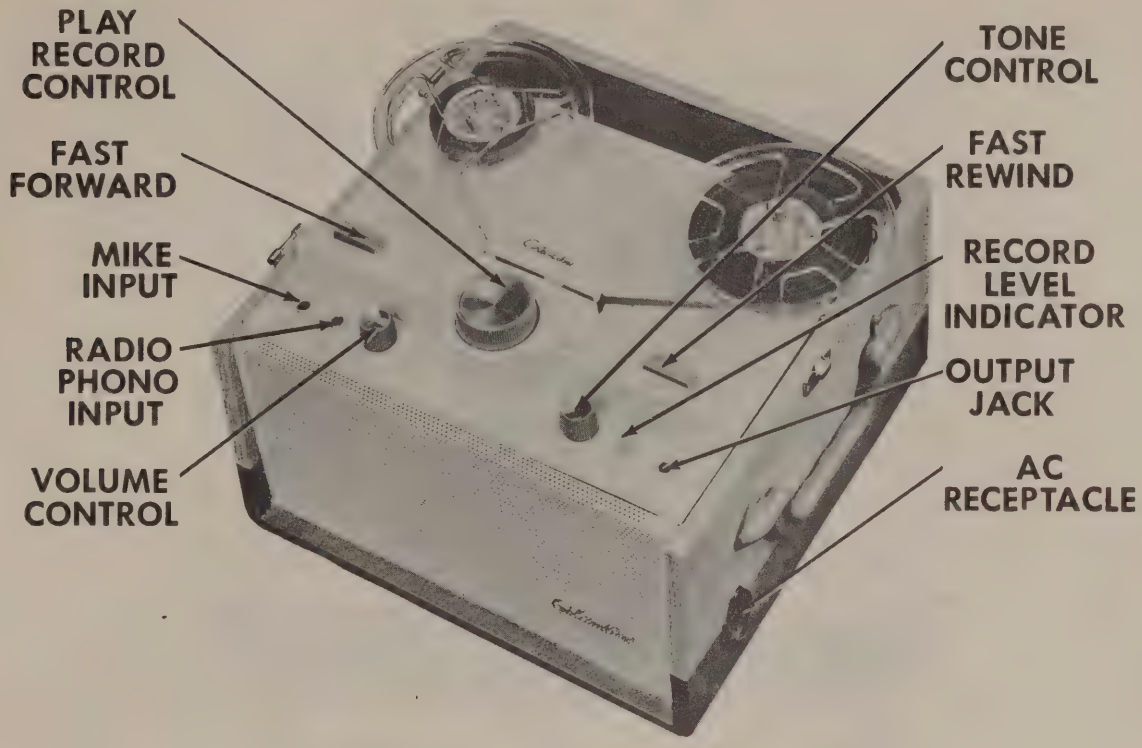

Figure 1

GENERAL INFORMATION

The Columbia Model 461 Tape Recorder is designed to record and play back two tracks of material on standard width recording tape, which doubles the playing time of a reel of tape with no loss of frequency response or quality. Recordings can be made from a radio, television receiver or phonograph, in addition to those made directly from the microphone. Recordings can be played back through the self-contained speaker or an external speaker through use of the Output Jack.

Model 461 is designed for a tape velocity of 7 1/2" per second. Using both channels of the tape, the recording time is as follows:

Size Reel	Speed 7 1/2"
5" (600 ft.)	1/2 hour
7" (1200 ft.)	1 hour

This recorder is designed to operate on 60 cycle, 110-120 volts, AC supply only.

CAUTION: Severe Damage Will Result If Connection Is Made To A Direct Current (DC) Line.

Manufactured by:

Columbia Records
799 Seventh Avenue
New York, N.Y.

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DENVER, COLORADO

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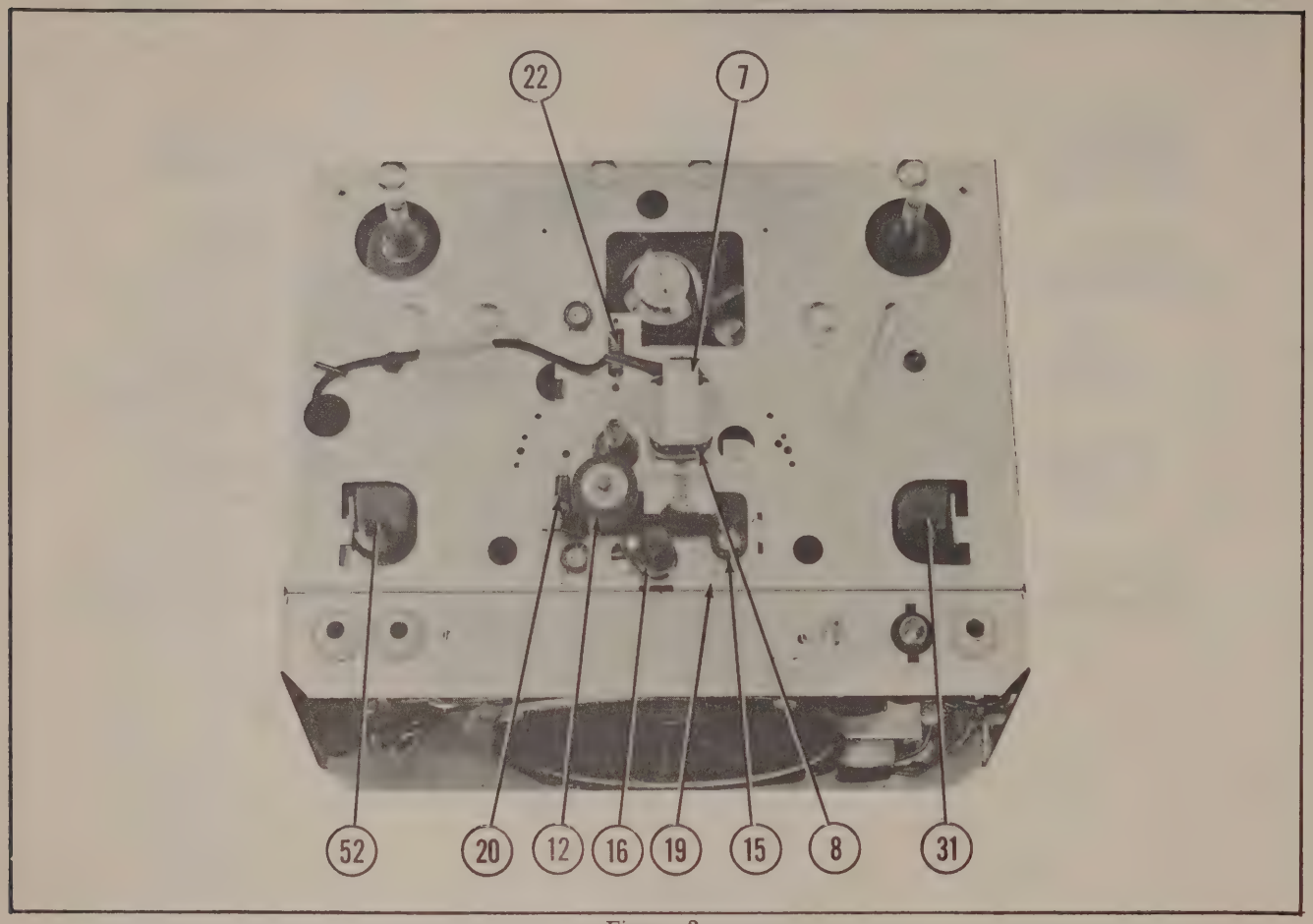


Figure 2

SPECIFICATIONS

Controls: On-Off Tone, Volume, Record-Playback, Fast Forward, Fast Rewind.

Tubes: 12AU7A, 12AX7, 6V6GT, 6X5.

Frequent Response: 65 to 10,000 cycle per second.

Power Requirements: 110-120 volts — 60 cycle A.C. only @ 70 watts.

Power Output: 2 watts undistorted — 3 watt maximum.

Inputs: Mike — 1 Meg.Imp., Radio-Phono. 5 Meg.Imp.

Output: Int. 5" Speaker, Ext. 3.2Ω Speaker, Ext. 1 Meg.Imp. for Ext. Amp. or Monitor in record.

Bias & Erase Frequency: 50KC.

OPERATING INSTRUCTIONS

Threading The Tape-

1. Place a reel of tape on the right reel plate (2A) and an empty reel on the left reel plate (2B) making sure the reel slots engage the pins on the reel plates.

2. Unwind about 10" of tape from the reel. Hold a section of the tape straight with both hands and insert the tape in the tape slot making sure the dull coated side faces the rear of the recorder.

3. Insert the free end of the tape into one of the three radial slots in the hub of the empty reel. Turn the reel several turns, clockwise, until the tape is secured to the reel and all slack is taken up between reels.

To Record From Microphone-

1. Turn the On-Off Tone Control clockwise until a click is heard and allow about thirty seconds for the tubes to warm up.

2. Insert the microphone plug into the "Mike" jack.

3. Depress the play-record control knob (3) as far as it will go, turn clockwise until it locks while holding it down.

4. Hold the microphone about six inches from your mouth and speak in a normal voice. Adjust the "Volume" control until the record level indicator flashes on the loudest sounds.

NOTE: Correct recording volume is very important. Too weak a signal, which does not cause the record level indicator to flash, will result in weak playback and high background noise. Too strong a signal, causing the level indicator to flash continuously, will result in distortion during playback.

To Record From Radio-

Recordings from a radio may be made by one of three ways:

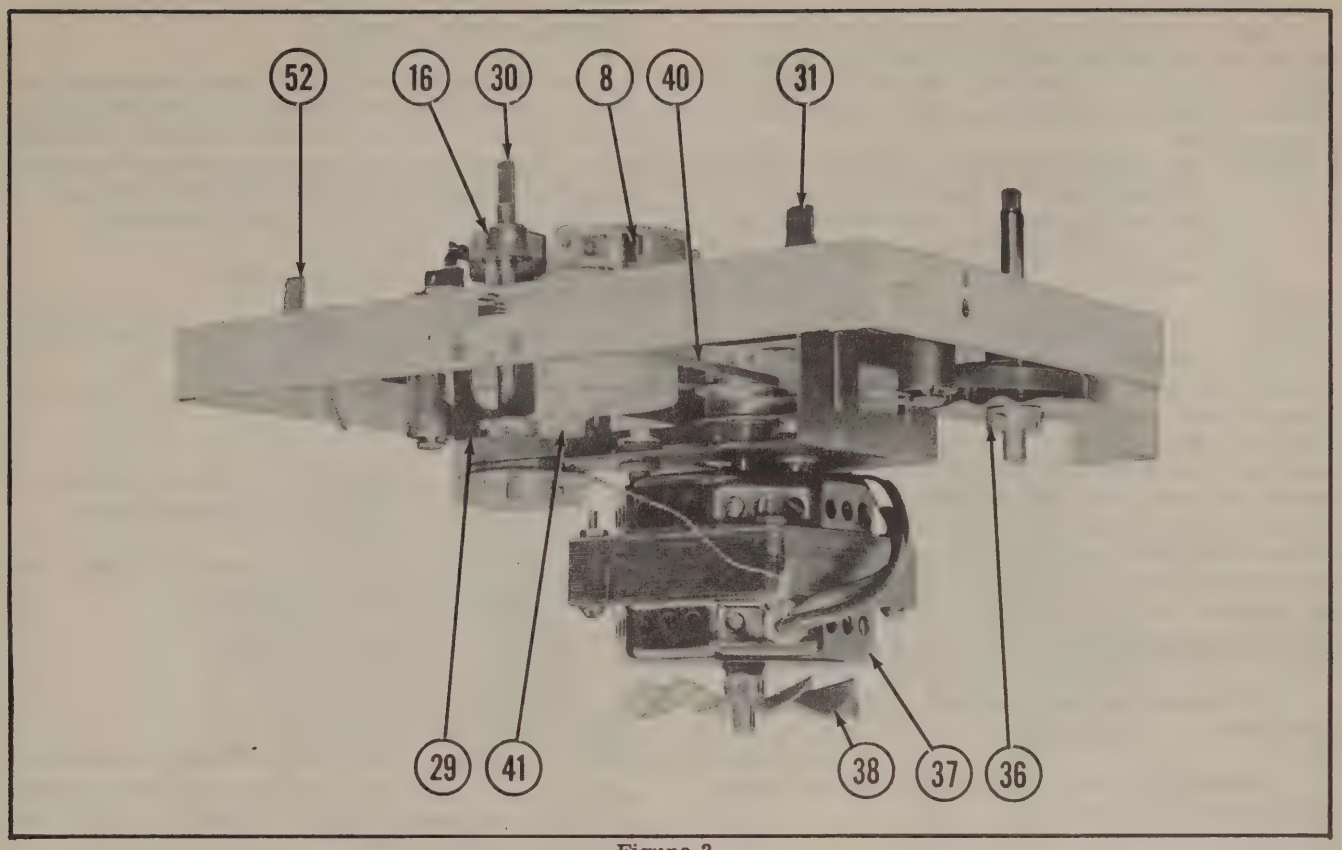


Figure 3

1. Place the microphone about 6" to 12" in front of the radio speaker. Turn the radio volume control to a normal level. Setting it too high will cause distortion. Turn the radio tone control to maximum treble. Set the recording level and proceed with recording as described under "To Record From Microphone". This type of recording may not be satisfactory as other sounds may be picked up by the microphone which as a result will be recorded on the tape.

2. Have a shielded cable made up with a two conductor phone plug on one end and two alligator clips on the other end. Connect the alligator clips across the voice coil terminals on the radio speaker and insert the cord plug into the "Radio-Phono" jack. Set the radio volume and tone controls as described above. Set the recording level and proceed as described under "To Record From Microphone".

3. Have a shielded cable with a two conductor phone plug on one end and the other end connected across the radio volume control. Insert the phone plug into the "Radio-Phono" jack. Set the recording level and proceed with the recording as described under "To Record From Microphone." The position of the radio volume and tone controls has no effect on this setup and may be set anywhere.

To Record From Phonograph-

1. If the phonograph being used has a phone type plug on the pickup leads, insert it into the "Radio-Phono" jack. Set the recording level and proceed with the recording as described under "To Record From Microphone".

2. If the phonograph has a standard pin type plug which is more common, an adaptor is needed. Insert the pin plug into the adaptor and plug the adaptor into the "Radio-Phono" jack.

To Record From Television Receiver-

1. Use one of the three methods described under "To Record From Radio" and proceed with the recording as described under "To Record From Microphone".

Dual Track Recording-

The Columbia is designed so that only one-half the tape width is recorded at a time; thereby resulting in two track recording. This two track operation is accomplished in the following manner:

1. After a reel of tape has been recorded, i.e. all of the tape wound on to the tape-up reel, turn the play-record control (3) to idle.

2. Remove the reels from the recorder, turning the full reel over and placing it on the right reel plate (2A) and the empty reel on the left reel plate (2B).

3. Properly thread the tape and proceed with the recording.

4. After this track has been recorded the first track of recording is ready to be played without rewinding, by reversing the reels as described in step 2 above.

Fast Forward And Fast Rewind-

High speed forward or reverse can be obtained by pressing the desired knob (4A or 4B) toward the

head cover. Movement of these controls will wind the tape on the desired reel at a high speed as long as the control is held in this position. These are used primarily in locating a desired portion of a recording in a few seconds.

CAUTION: Do not attempt "Fast Forward" or "Fast Rewind" with the play-record control (3) on anything but idle position, as damage to the unit or breaking of the tape may result.

Braking-

The Columbia is equipped with a quick stop when in high speed, either direction. Move both "Fast Forward" and "Fast Rewind" controls toward the head cover and then release both at the same time. For example: when in fast forward speed, continue to hold control and with the other hand move "Fast Rewind" control toward head cover. When machine stops, release both controls at the same time. If a coasting stop is desired, release control in motion and tape will glide to a momentum stop.

To Play A Recording-

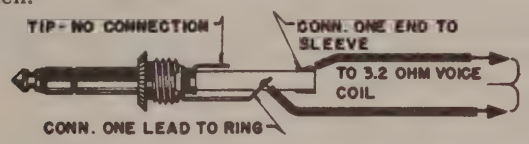
1. Thread tape as described under "Threading The Tape".

2. Turn play-record control (3) clockwise without depressing until it locks.

3. Adjust the "Volume" and "Tone" controls for desired listening level.

To Use An External Speaker-

1. You may want to use a larger speaker than the one in the recorder. To do this you will need a three conductor phone plug connected as shown in sketch.



2. Plug this into the Output jack and play the recorder thru the external speaker. The internal speaker is cut off.

CAUTION: Do not connect three conductor plug into Output jack without external speaker attached; as damage to the output tube, transformer, and "Tone Control" may result.

To Edit And Splice Tape-

NOTE: Since it is impossible to edit and splice one track without affecting the other, recordings which are to be edited should be limited to one track only.

1. The tape may be edited by cutting out unwanted portions, or by joining selections into another sequence. Announcements may be inserted between selections, etc. Unused sections of tape can be spliced together for re-use.

2. For best results, cut tape at a slight diagonal, join ends together with splicing tape on the glossy side and trim off any excessive width.

Erasing Recorded Material-

In the record position any recording on the tape is automatically erased before a new recording is put on the tape. If it is desired to erase a recording without putting anything on the tape follow the normal recording procedure, but leave the "Volume" control set at its extreme counterclockwise position.

To Use As A Public Address System-

1. Insert the microphone plug into the "Radio-Phono" jack.

2. Leave the play-record control (3) in idle position.

3. Speak into the microphone and adjust the "Volume" and "Tone" controls for desired level.

4. Do not have the microphone too close to the speaker or a feedback howl will result.

ADJUSTMENTS

Removing Unit From Case-

All service work except cleaning of the head and pressure roller and adjustment of the head and pressure pad assembly require removal of the unit from the carrying case.

1. To remove unit from carrying case, disconnect power cord and remove the four phillips head screws from bottom of case and carefully lift unit straight up and out.

Spindle (9A and 9B) End Play Adjustments-

The spindles should have from 1/32" to 1/16" of up and down movement. Loosen the set screw in the pulley (36 or 47) and move the pulley up or down until the correct amount of end play is obtained.

Tape Up And Feed Reel Drag Adjustment-

When the play-record control (3) is released, the reels should stop right away to prevent looping of the tape. Also when in fast forward or rewind and the control is released the reels should coast to a stop without looping the tape. The stop arms on the motor-board (point "B" on exploded view) that the take-up and feed reel arms (31 and 52) rest against when the tape is not moving are what govern this. The stop arms should be bent to force the take-up reel arm (52) and the feed reel arm (31) over for enough to take up enough belt tension so that the spindles just start to revolve without the reels in place. The play-record control (3) should be in its extreme counterclockwise position when making this adjustment. With the reels in place the spindles should not revolve. If one or the other dose, force the stop arm (point "B" on exploded view) over until it stops revolving.

Lifter Arm (16) Adjustment-

This adjusts the distance that the contact strip on the play-record switch will move when going into the record position. If an adjustment is necessary,

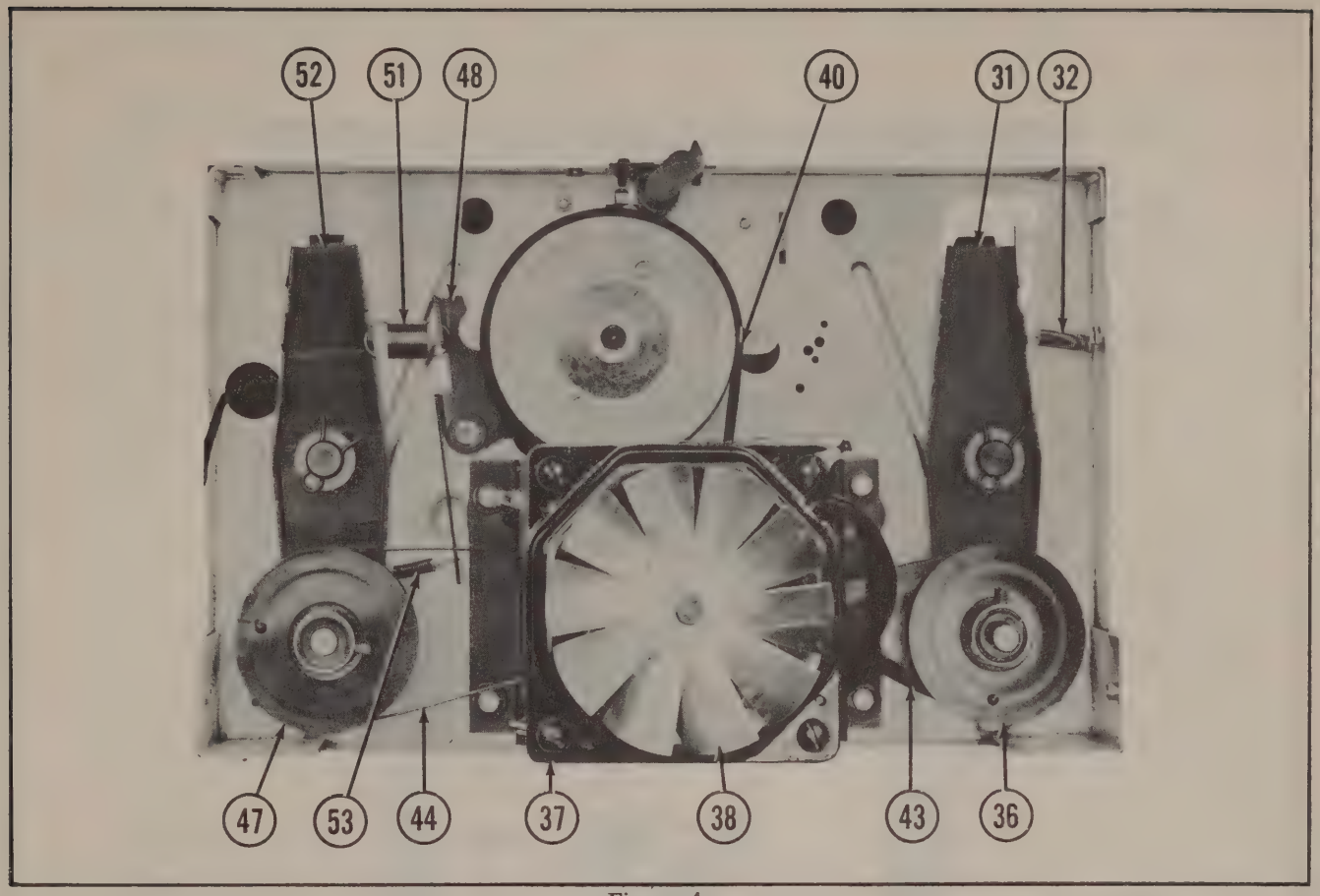


Figure 4

depress and turn the play-record control (3) clockwise. Loosen the set screw in the lifter arm (16) and rotate control knob (3) to the left or right to center the contact strip with the contacts on the left end of the switch. Make sure lifter arm (16) is down as far as it will go and tighten its set screw.

Play-Record-Erase Head Adjustment-

It is very important that the head (8) be lined up perfectly with the tape. If it is not, low output, loss of high frequencies, or track overlap may result. If head (8) requires replacement the complete assembly comprised of head (8) and head holder (7) should be replaced. The head holder (7) is adjusted individually to each head (8) and sealed at the factory. When installing head (8) observe the following precautions:

1. One is the head height. This is set by placing a .179" gauge (between 11/64" and 3/16") near the mounting bracket and between base plate (25) and bottom of head holder (7). Push down on head (8) and tighten screw (26). Withdraw gauge.

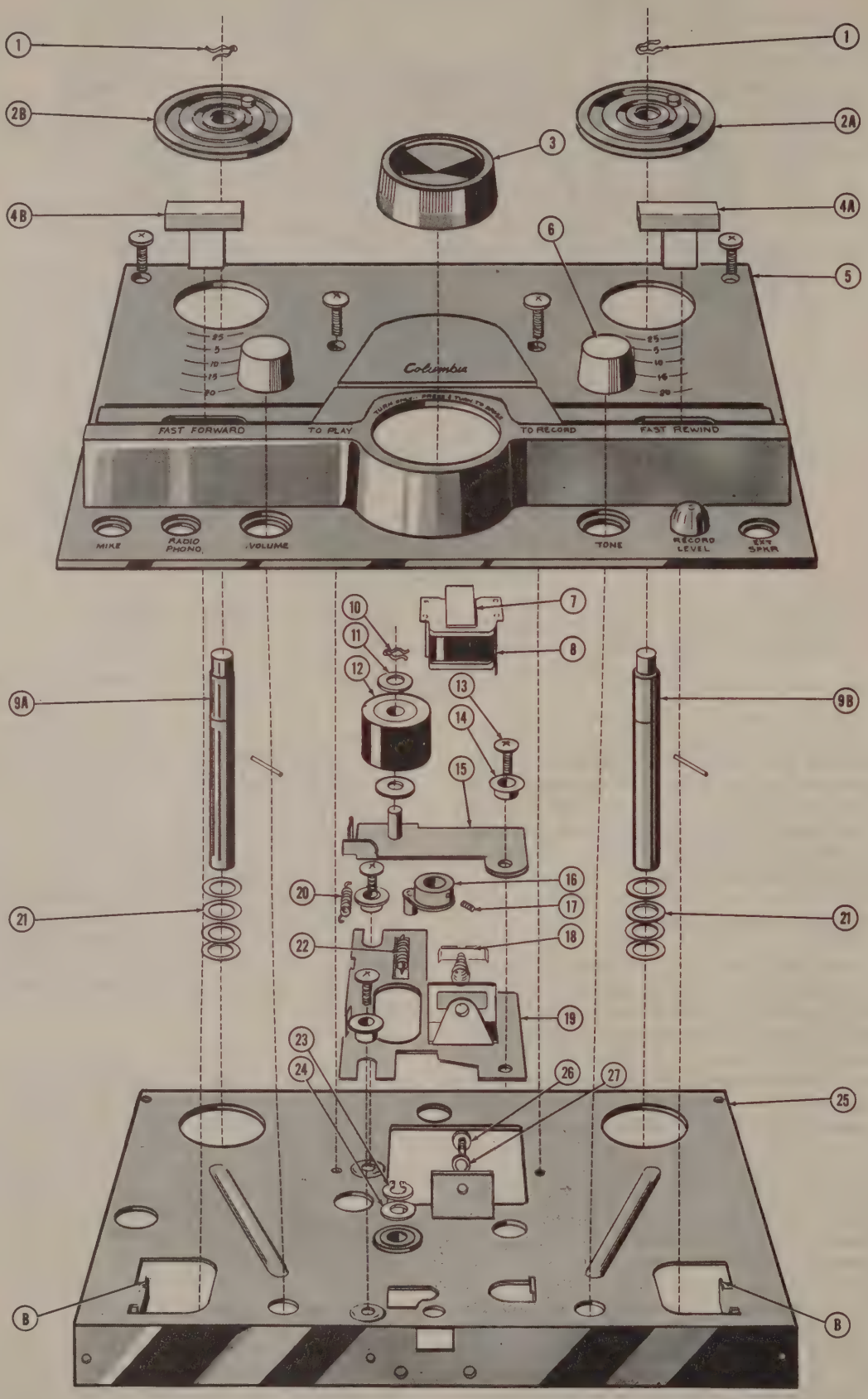
2. The second adjustment is for output and frequency response. To make this adjustment a tape on which a 3000 cycle note has been recorded by a unit known to be in good operating condition will be required. Connect an output meter or an A.C. voltmeter across the speaker voice coil of the unit to be adjusted. While playing back the 3000 cycle note tape, pivot head (8) back and forth on mounting screw (26) until maximum amplitude on output meter is achieved. Make sure that head (8) has not changed its height. If a 3000 cycle note tape cannot be made, use a recording with high note content and make the adjustment described above.

3. Track overlap, this should be checked by first making a recording on a blank tape with the unit being checked. Do not rewind the tape, but merely reverse the reels and playback the other track. There should be no sound but, if what is heard is backwards, there is track overlap. To correct this, it will be necessary to adjust the tape guide on side of head holder (7) by bending it upwards. This should move the tracks further apart.

NOTE: When ordering a replacement head, be sure to get the complete assembly of head, plug and bracket. The bracket is adjusted to the individual head and sealed at the factory. Also, when ordering a replacement motor, be sure to get the complete assembly of motor, pulley and plug. The pulley is turned down on the individual motor and is not interchangeable.

Hum Balance Adjustment-

If tube V1 or V2 is replaced or the head changed the setting of the hum balance pot (R3) should be checked. To do this, connect an external speaker to the unit as described under "To Use An External Speaker". Connect an A.C. voltmeter with a .1 volt A.C. scale across the speaker voice coil. Turn the "Volume" and "Tone" controls clockwise. Place the play-record control (3) in "Play" position. Put the



A PHOTOFACT "EXPLODED" VIEW
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Figure 5A. Exploded View Of Parts Above Baseplate.

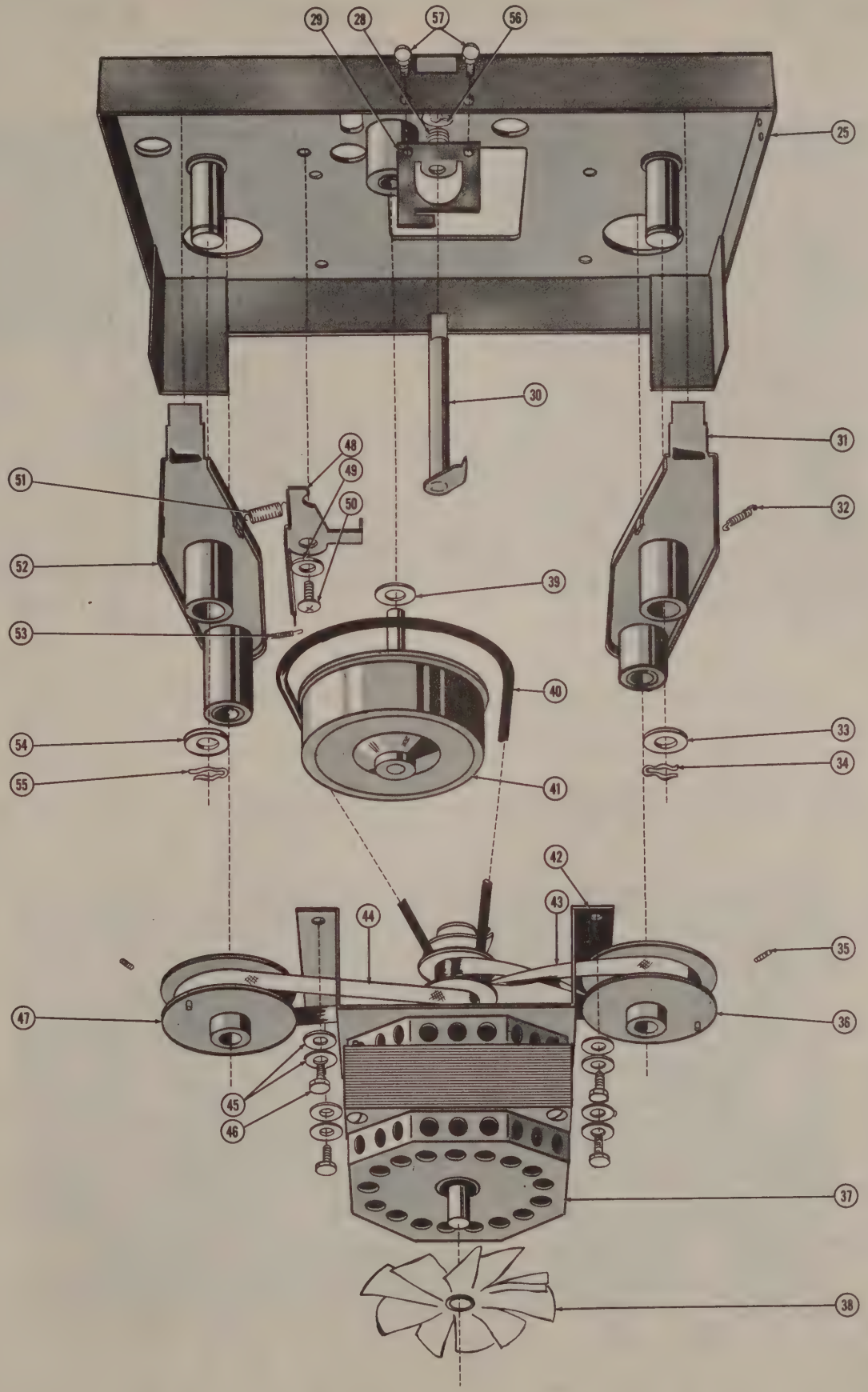

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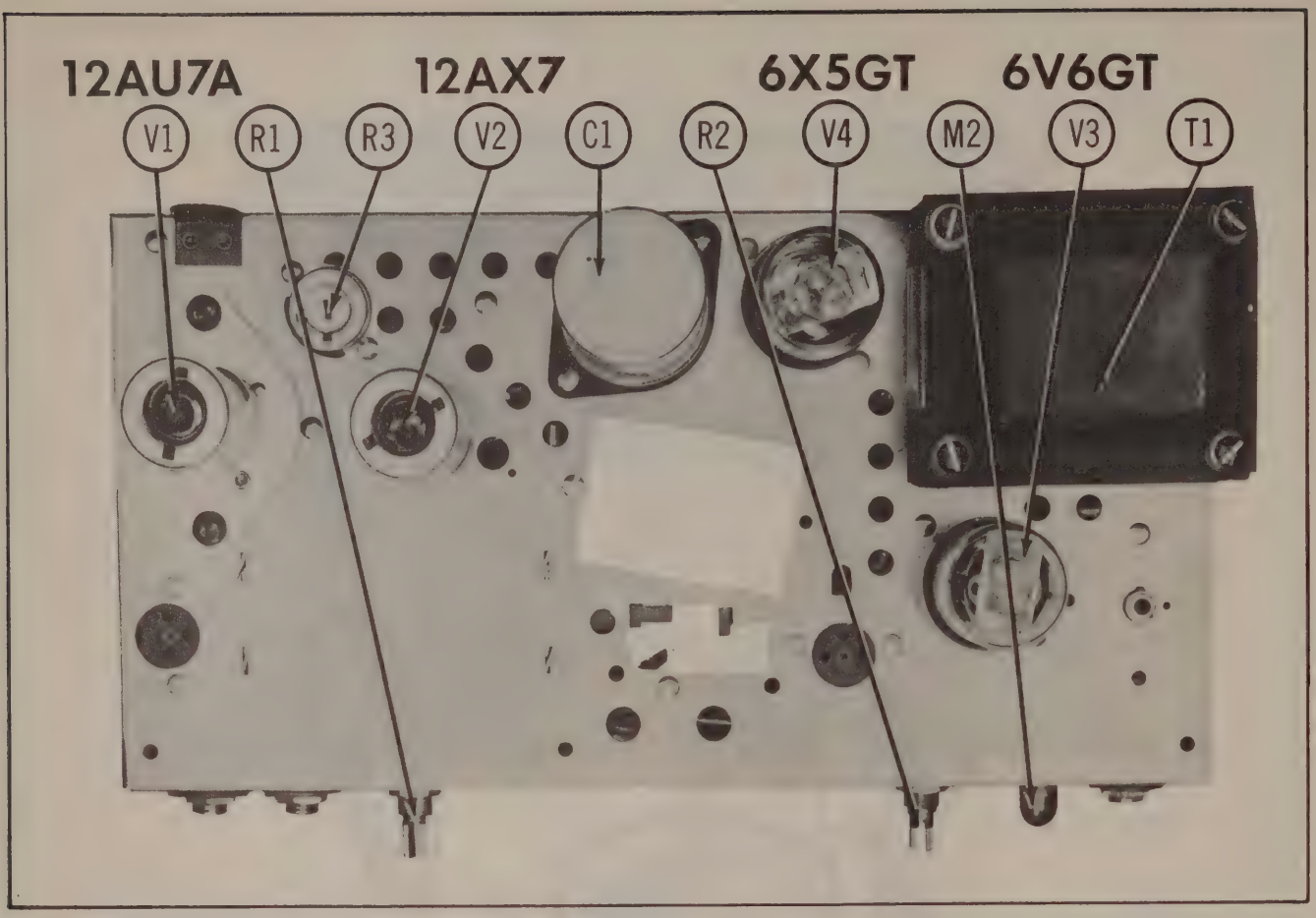
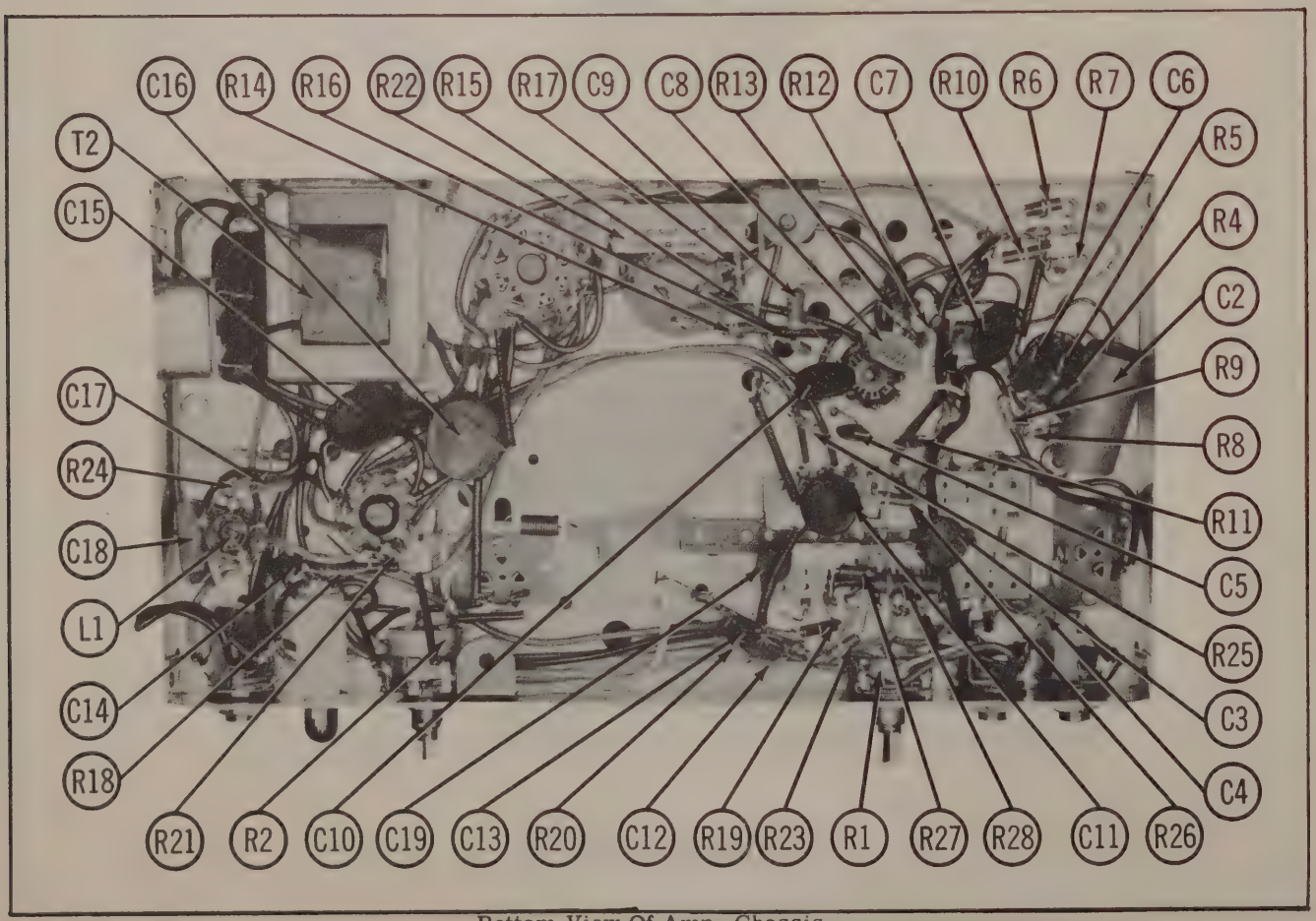
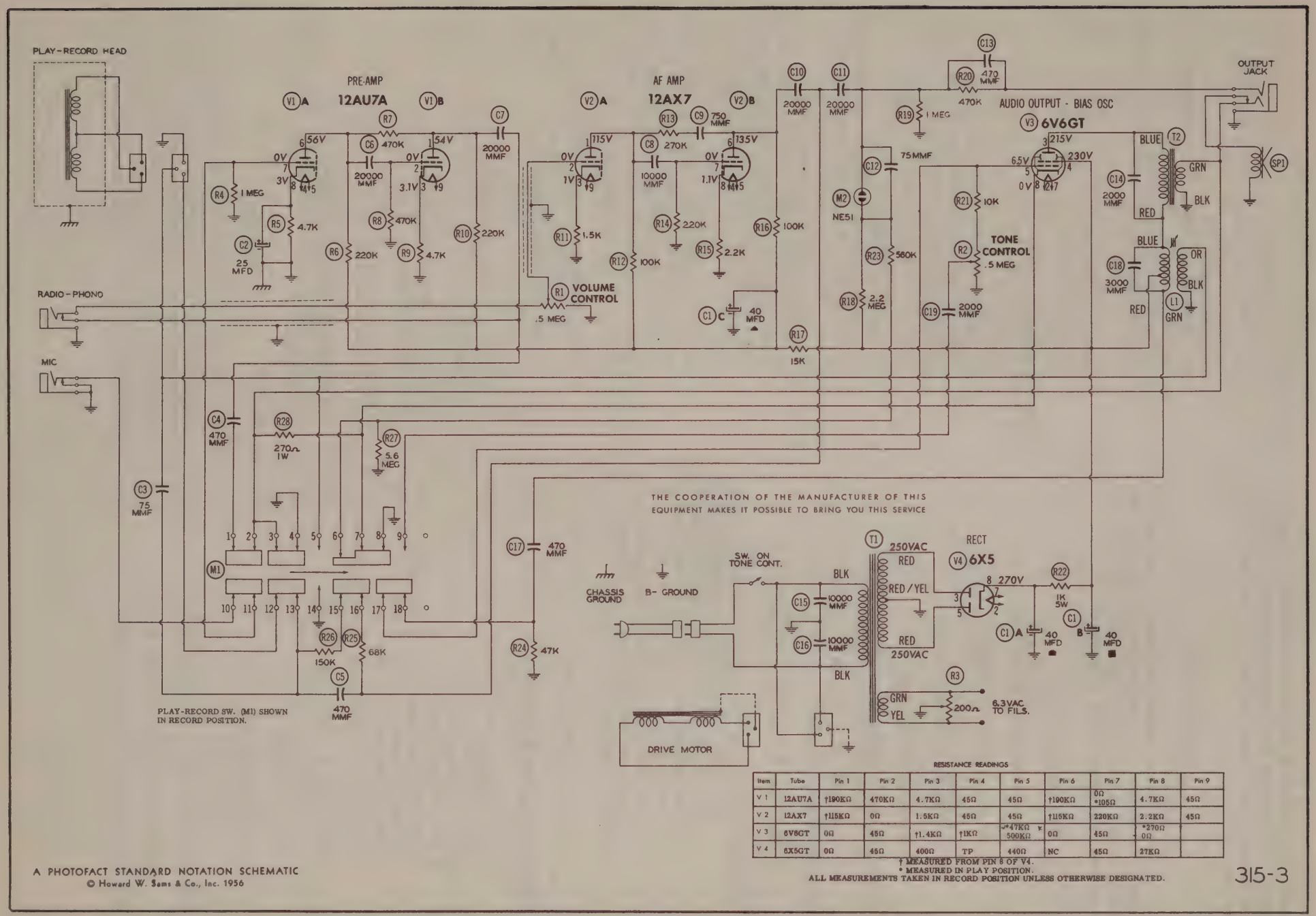
Figure 5B. Exploded View Of Parts Below Baseplate.



Top View Of Amp. Chassis.



Bottom View Of Amp. Chassis.



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AU7A	†190KΩ	470KΩ	4.7KΩ	45Ω	45Ω	†190KΩ	0Ω *105Ω	4.7KΩ	45Ω
V 2	12AX7	†115KΩ	0Ω	1.5KΩ	45Ω	45Ω	†115KΩ	220KΩ	2.2KΩ	45Ω
V 3	6V6GT	0Ω	45Ω	†1.4KΩ	†1KΩ	*47KΩ to 500KΩ	0Ω	45Ω	*270Ω 0Ω	
V 4	6X5GT	0Ω	45Ω	400Ω	TP	440Ω	NC	45Ω	27KΩ	

† MEASURED FROM PIN 8 OF V4.
* MEASURED IN PLAY POSITION.
ALL MEASUREMENTS TAKEN IN RECORD POSITION UNLESS OTHERWISE DESIGNATED.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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315-3

COLUMBIA
MODEL 461

A.C. meter on the .1 volt scale and adjust the hum pot. (R3), which is located between tubes V1 and V2 on top of the chassis, to its minimum reading. It should not exceed .1 volt. This is the only adjustment required in the amplifier.

LUBRICATION

The lubricants applied at time of manufacture should be sufficient for a long period of time. Approximately once a year, or in the event that parts are replaced, lubricate the unit as follows:

With No. 20 Motor Oil-

1. Take-up reel arm (52) bushing.
2. Feed reel arm (31) bushing.
3. Spindle (9A and 9B) bearings.
4. Flywheel (41) bearings.

With Staput No. 312 Grease Or Lubriplate-

1. Pressure plate (19) at the slide button and the guide on the right side.
2. On the stud of the lifter arm (16).

CAUTION: Do not oil the motor bearings unless absolutely necessary as excess oil will only be thrown off and cause slipping of the pulleys and rollers. Always use as little oil as possible. If oil should get on the pulleys and rollers wipe off with a petroleum solvent, such as alcohol. Do not use carbon-tetrachloride.

TROUBLES

Won't Take Up Tape Properly-

1. Spindle (9A) binding.
   (a) Lubricate.
2. Belt (44) slipping.
   (a) Clean motor pulley and pulley (47).
3. Belt (44) broken.
   (a) Remove bracket (42) and replace belt.
4. Set screw loose in pulley (47).
   (a) Tighten and leave 1/32" to 1/16" end play in spindle.
5. Pulley (47) broken.
   (a) Replace pulley.

Fast Forward Won't Function Properly-

1. See above except for step 2.

Fast Rewind Won't Function Properly-

1. Spindle (9A or 9B) binding.
2. Belt (43) slipping.
   (a) Clean motor pulley and pulley (36).
3. Belt (43) broken.
   (a) Remove bracket (42) and replace belt.
4. Set screw loose in pulley (36).
   (a) Tighten and leave 1/32" to 1/16" end play in spindle.
5. Pulley (36) broken.
   (a) Replace pulley.

Speed Variation Or Wow-

1. Slippage
   (a) Clean motor pulley, flywheel and capstan (41) and pressure roller (12) with a petroleum solvent, not carbon-tetracholoride. Replace rubber rollers if they appear oil soaked.
2. To much feed reel drag.
   (a) Check adjustment as described under "Take-Up And Feed Reel Drag Adjustment".
3. Flat spot on rubber roller (12).
   (a) A rapid thumping sound while the unit is running may indicate a flat spot on the rubber tire. If this condition does not clear up after several minutes of running time replace the roller.
   (b) If the surface of the rubber roller is not smooth and even, replace the part.
   (c) Should the bearings on the rollers show signs of excessive wear or be extremely wobbly, the rollers should be replaced.
4. Tight feed of take-up spindle (9A or 9B).
   (a) Check adjustment as described under "Spindle End Play Adjustment".
   (b) Lubricate.
5. Tight pressure roller (12).
   (a) Lubricate.
6. Tight flywheel shaft (41).
   (a) Lubricate.

Tape Creeps Out Of Slot-

1. Head (8) improperly adjusted.
   (a) "See" Play-Record-Erase Head Adjustment."

CLEANING

The record playback head (8), capstan shaft and pressure roller (12) are subject to an accumulation of tape coating residue, which is worn off the tape as it passes these parts. This can cause distortion, weak output and poor erasure. Use a soft cloth and alcohol to clean the bead surfaces; capstan and pressure roller.

MECHANICAL PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	460162	Reel Holder Retainer	29	100660	Control Shaft Bracket
2A	310314	Feed Reel Holder	30	011723	Control Shaft
2B	310314	Take Up Reel Holder	31	011330	Rewind Arm
3	310300	Play-Record Knob	32	420173	Rewind Arm Brake Spring
4A	310299	Fast Rewind Knob	33	580156	Washer
4B	310299	Fast Forward Knob	34	460110	Retainer
5	012498	Top Plate	35	600247	Set Screw
6	310301	Volume & Tone Knobs	36	011317	Feed Reel Pulley
7		Head Holder (Part Of Head)	37	011692	Motor, 115V, 60 Cycle, Inc. Pulley, Cable & Plug.
8	011311	Head (inc. 7)			
9A	011319	Take Up Reel Spindle	38	011321	Fan
9B	011319	Feed Reel Spindle	39	580141	Washer
10	460111	Pressure Roller Retainer	40	490087	Rubber Belt
11	580143	Cloth Washer	41	011694	Flywheel & Shaft Assembly
12	011236	Pressure Roller	42	011739	Motor Mounting Bracket
13	600243	Screw #6-32 x 1/4" (3)	43	490089	Feed Reel Drive Belt
14	200288	Slide Button (3)	44	490089	Take Up Reel Drive Belt
15	012328	Pressure Roller Arm	45	580056	Washer
16	012329	Lifter Arm	46	600256	Screw
17	600247	Set Screw	47	011317	Take Up Reel Pulley
18	011316	Pressure Shoe, Inc. Felt Pads	48	100809	Take Up Lever
19	012381	Pressure Plate	49	200288	Washer
20	420174	Capstan Pressure Spring	50	600243	Screw
21	580141	Washer	51	420161	Take Up Spring
22	420171	Pressure Plate Spring	52	011329	Take Up Arm
23	460018	Shaft & Flywheel Retainer	53	420172	Take Up Lever Brake Spring
24	580141	Washer	54	580156	Washer
25	012325	Base Plate	55	460110	Retainer
26	600137	Retains Head Screw	56	460117	Retainer
27	580056	Washer	57	600111	Screws
28	420109	Record Release Spring			

ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
V1		12AU7A, Pre-Amp.			@ 1500V.
V2		12AX7, AF Amp.	C15	770071	Cap. Ceramic Disc, 10000MMF
V3		6V6GT, Audio Output-Bias Osc.			@ 1500V.
V4		6X5GT, Rectifier	C16	770071	Cap. Ceramic Disc, 10000MMF
C1A	770088	Elect. Cap., 40MFD @ 300V.			@ 1500V.
C1B		Elect. Cap., 40MFD @ 300V.	C17	770090	Cap. Ceramic Disc, 470MMF
C1C		Elect. Cap., 40MFD @ 300V.			@ 400V.
C2	770003	Elect. Cap., 25MFD @ 25V.	C18		Cap. Mica, 3000MMF @ 400V.
C3	770097	Cap. Ceramic Disc, 75MMF	C19	770110	Cap. Ceramic, 2000MMF
		@ 400V.			@ 1500V.
C4	770090	Cap. Ceramic Disc, 470MMF	R1	740051	Volume Cont., 500K
		@ 400V.	R2	740052	Tone Cont. & Sw., 500K
C5	770090	Cap. Ceramic Disc, 470MMF	R3	740045	Hum Cont., 200Ω W.W.
		@ 400V.	R4	760001	Resistor, 1Meg, 1/2W.
C6	770095	Cap. Ceramic Disc, 20000MMF	R5	760017	Resistor, 4.7K, 1/2W.
		@ 500V.	R6	760036	Resistor, 220K, 1/2W.
C7	770095	Cap. Ceramic Disc, 20000MMF	R7	760037	Resistor, 470K, 1/2W.
		@ 500V.	R8	760037	Resistor, 470K, 1/2W.
C8	770096	Cap. Ceramic Disc, 10000MMF	R9	760017	Resistor, 4.7K, 1/2W.
		@ 500V.	R10	760036	Resistor, 220K, 1/2W.
C9	770094	Cap. Ceramic Disc, 750MMF	R11	760003	Resistor, 1.5K, 1/2W.
		@ 400V.	R12	760010	Resistor, 100K, 1/2W.
C10	770095	Cap. Ceramic Disc, 20000MMF	R13	760052	Resistor, 270K, 1/2W.
		@ 500V.	R14	760036	Resistor, 220K, 1/2W.
C11	770095	Cap. Ceramic Disc, 20000MMF	R15	760047	Resistor, 2.2K, 1/2W.
		@ 500V.	R16	760010	Resistor, 100K, 1/2W.
C12	770097	Cap. Ceramic Disc, 75MMF	R17	760040	Resistor, 2.2Meg, 1/2W.
		@ 400V.	R18	760040	Resistor, 2.2Meg, 1/2W.
C13	770090	Cap. Ceramic Disc, 470MMF	R19	760001	Resistor, 1Meg, 1/2W.
		@ 400V.	R20	760037	Resistor, 470K, 1/2W.
C14	770110	Cap. Ceramic Disc, 20000MMF	R21	760019	Resistor, 10K, 1/2W.

ELECTRICAL PARTS LIST (Cont.)

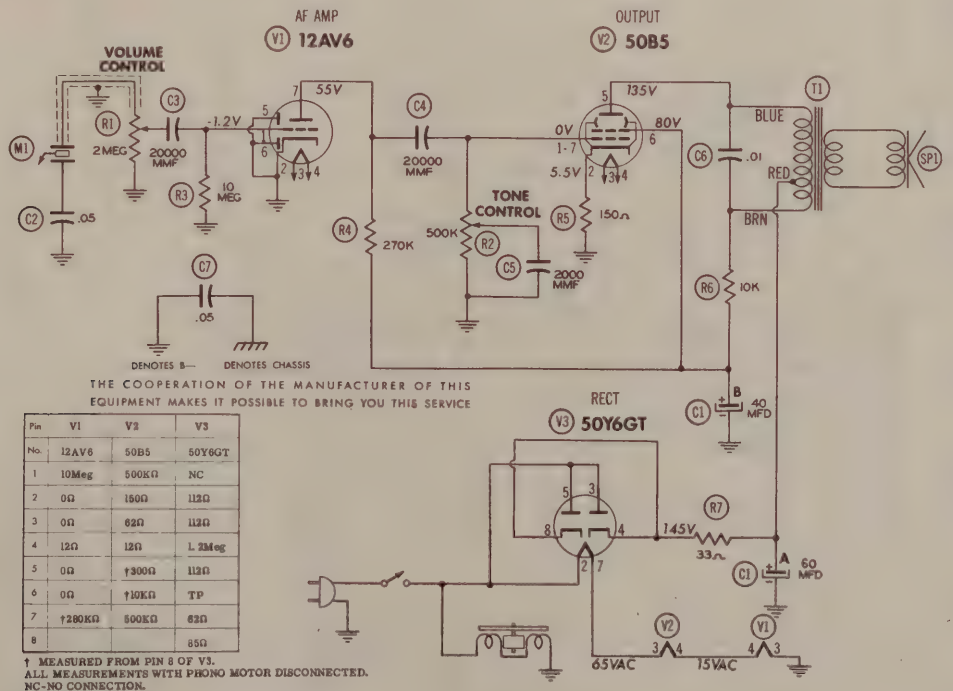
Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
R22	760304	Resistor, 1000Ω, 5 W.	T1	700054	Power Transformer
R23	760039	Resistor, 560K, 1/2 W.	T2	700055	Output Transformer
R24	760013	Resistor, 47K, 1/2 W.	L1	700080	Osc., Coil
R25	760062	Resistor, 68K, 1/2 W.	M1	740053	Play-Record Switch
R26	760064	Resistor, 150K, 1/2 W.	M2	730006	Record Level, Lamp, Neon NE51
R27	760054	Resistor, 5.6Meg, 1/2 W.			
R28	760115	Resistor, 270Ω, 1 W.	SP1		PM Speaker 5 1/4"

CRESCENT MODELS 452A, 453A, 601, 1600, 1601

CRESCENT MODELS 452A, 453A, 601, 1600, 1601

TRADE NAME	Crescent Models 452A, 453A, 601, 1600, 1601
MANUFACTURER	Crescent Industries, Inc., 5900 W. Touhy Ave., Chicago 31, Ill.
TYPE SET	AC Operated Phono Amplifier With Automatic Record Changer
TUBES (Three)	Types 12AV6 AF Amplifier, 50B5 Output, 50Y6GT Rectifier
POWER SUPPLY	105-120 Volts AC-60 Cycles
RATING	.20 Amp. @ 117 Volts AC

FOR SERVICE INFORMATION ON THE 3 SPEED AUTOMATIC RECORD CHANGER, CRESCENT MODEL 500 SERIES, USED IN MODELS 601, 1600, 1601-SEE PHOTOFACT SET #197 - FOLDER #4 OR RECORD CHANGER MANUAL CM-5. MODELS 452A, 453A USE A CRESCENT 45RPM AUTOMATIC RECORD CHANGER.



Pin No.	V1	V2	V3
1	10Meg	500KΩ	NC
2	0Ω	150Ω	112Ω
3	0Ω	62Ω	112Ω
4	12Ω	12Ω	1.2Meg
5	0Ω	†300Ω	112Ω
6	0Ω	†10KΩ	TP
7	†280KΩ	500KΩ	62Ω
8			85Ω

† MEASURED FROM PIN 8 OF V3.
ALL MEASUREMENTS WITH PHONO MOTOR DISCONNECTED.
NC-NO CONNECTION.
TP-TIE POINT.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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315-4

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L. F. BLANKENSHIP
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DENVER, COLORADO

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PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	REPLACEMENT DATA		NOTES
		CRESCENT PART No.	STANDARD REPLACEMENT	
V1	AF Amplifier	12AV6	12AV6	
V2	Output	50B5	50B5	
V3	Rectifier	50Y6GT	50Y6GT	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	CRESCENT PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	60	150						CSD-1550	
B	40	150							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	CRESCENT PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	.05	400		BPD-05	DF-503	CUB4S5		PT415	4TM-S5	
C3	20000			BPD-02	DD-203	KO85	817-02		5HK-S2	
C4	20000			BPD-02	DD-203	KO85	817-02		5HK-S2	
C5	2000			BPD-002	DD-202	KO72	801-002	DC522	5HK-D2	
C6	.01	400		BPD-01	D6-103	CUB4S1	811-01	PT411	4TM-S1	
C7	.05	400		BPD-05	DF-503	CUB4S5		PT415	4TM-S5	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	CRESCENT PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	2Meg	½	740035					Volume
R2	500KΩ	½	740058					Tone

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	CRESCENT PART No.	IRC PART No.	
R3	10Meg	½		BTS-10Meg	
R4	270KΩ	½		BTS-270K	
R5	150Ω	½		BTS-150	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	CRESCENT PART No.	IRC PART No.	
R6	10KΩ	½		BTS-10K	
R7	33Ω	1			

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	CRESCENT PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2.4KΩ	3.6Ω	700044	Z1102 ①	A-3031 ①	A-3336 ①	24S50A ①		① Drill one new mtg. hole.

SPEAKER

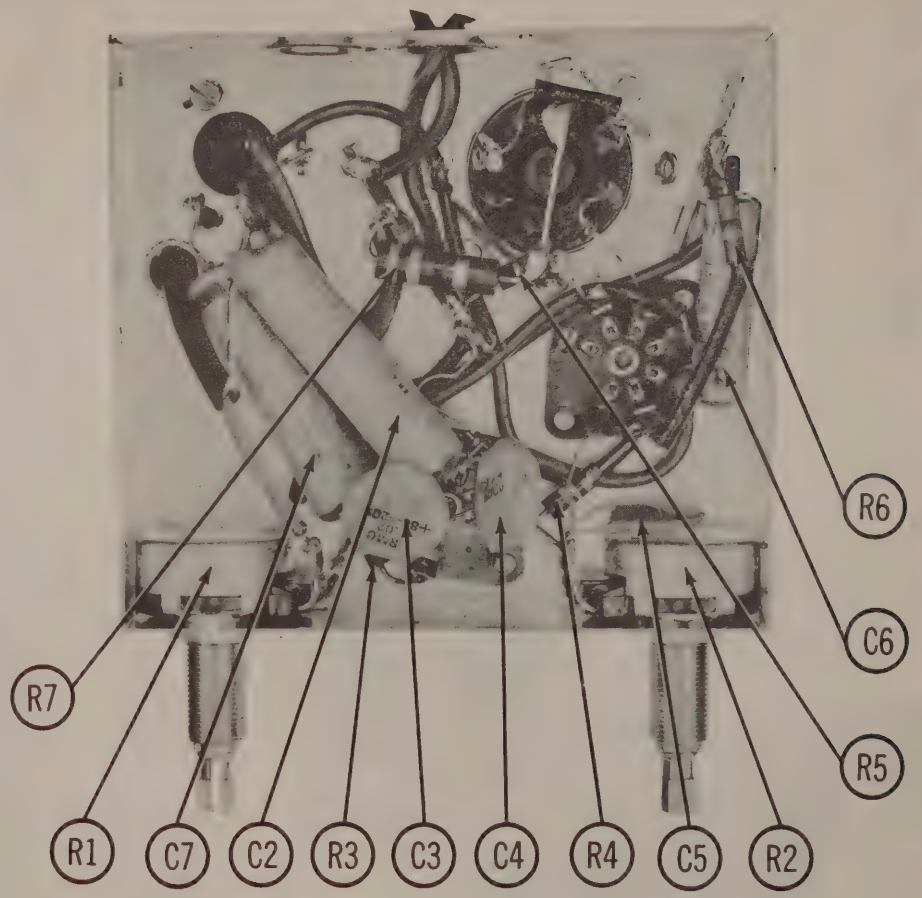
ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	CRESCENT PART No.	QUAM PART No.	RCA TYPE No.	
SP1	4"x 6"	PM	3.6Ω	011796	46A07	246S2	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA					REMARKS
	CRESCENT PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M1		51-1J	G-J	47	0-1 or S-1	Used in Models 452A and 453A.
M1						Used in Models 601, 1600 and 1601.

ASTATIC AND ELECTRO-VOICE NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR RESPECTIVE REPLACEMENT CARTRIDGES LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENT SEE BELOW.

CHASSIS—BOTTOM VIEW

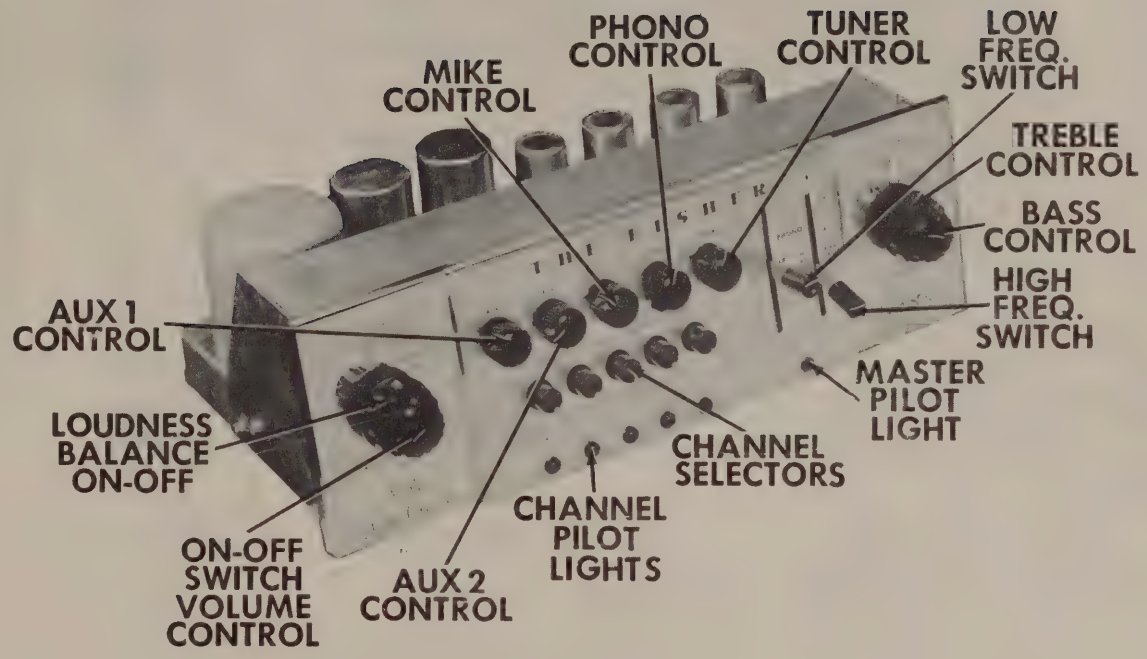


PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA				REMARKS
	CRESCENT PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	
M2	Used in Models 452A and 453A.	* A-84LP or † A-74LP or ♦ A-74LPD	* A-304 or † A-332 or ♦ A-332D	† W-3MGS or ♦ W-3MGD	* Metal † Jewel ♦ Diamond
M2	Used in Models 601, 1600, 2nd 1601.	* S-67 or † S-66 or ♦† S-66SD or ♦ S-66D	† AC-434 or ♦† AC-434D1 or † ♦ AC-434D2 or ♦ AC-434D	† W-75TPS or ♦† W-75DS or ♦ W-75TPD	

FISHER
MODEL 80-C



FISHER
MODEL 80-C

TRADE NAME	Fisher Model 80-C
MANUFACTURER	Fisher Radio Corp., 21-21 44th Drive, Long Island City 1, N. Y.
TYPE SET	AC Operated 5 Channel Audio Control Preamplifier With Equalizer.
TUBES (Four)	Types 12AX7 Phono Preamplifier, 12AX7 Mic Preamplifier - 2nd AF Amp. - 3rd AF Amp., 12AU7 Cathode Follower - Cathode Follower.
POWER SUPPLY	105-125 Volts AC - 50/60 Cycles RATING .17 Amp. @117 Volts AC.

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PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	REPLACEMENT DATA		NOTES
		FISHER PART No.	STANDARD REPLACEMENT	
V1	Phono Preamplifier	12AX7	12AX7	
V2	Mic Preamplifier - 2nd AF Amplifier	12AX7	12AX7	
V3	1st AF Amplifier - 3rd AF Amplifier	12AX7	12AX7	
V4	Cathode Follower - Cathode Follower	12AU7A	12AU7A	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	FISHER PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	10	350	Note 1	PRS350V10	BR1235	TC62	TD-10-450	FM-4510	TVA-1604
C2A	40	250	C-546-115				TM-Q40-250	D-130	TVL-2575
B	▲40	250						FMD-4530	TVA-2740
C	■40	250							
D	●40	250							
C3A	▲1000	30	C-546-116						
B	●1000	30							
C4	25	10	C-3340	PRS25V25	BR252	TC26	TD-25-25	FM-0225	TVA-1205
C5	1	250	C-546-126	PRS450V1	BR145		TD-4-250	MMT-4501	TVA-1701

Note 1. Not used in some versions.

FIXED CAPACITORS

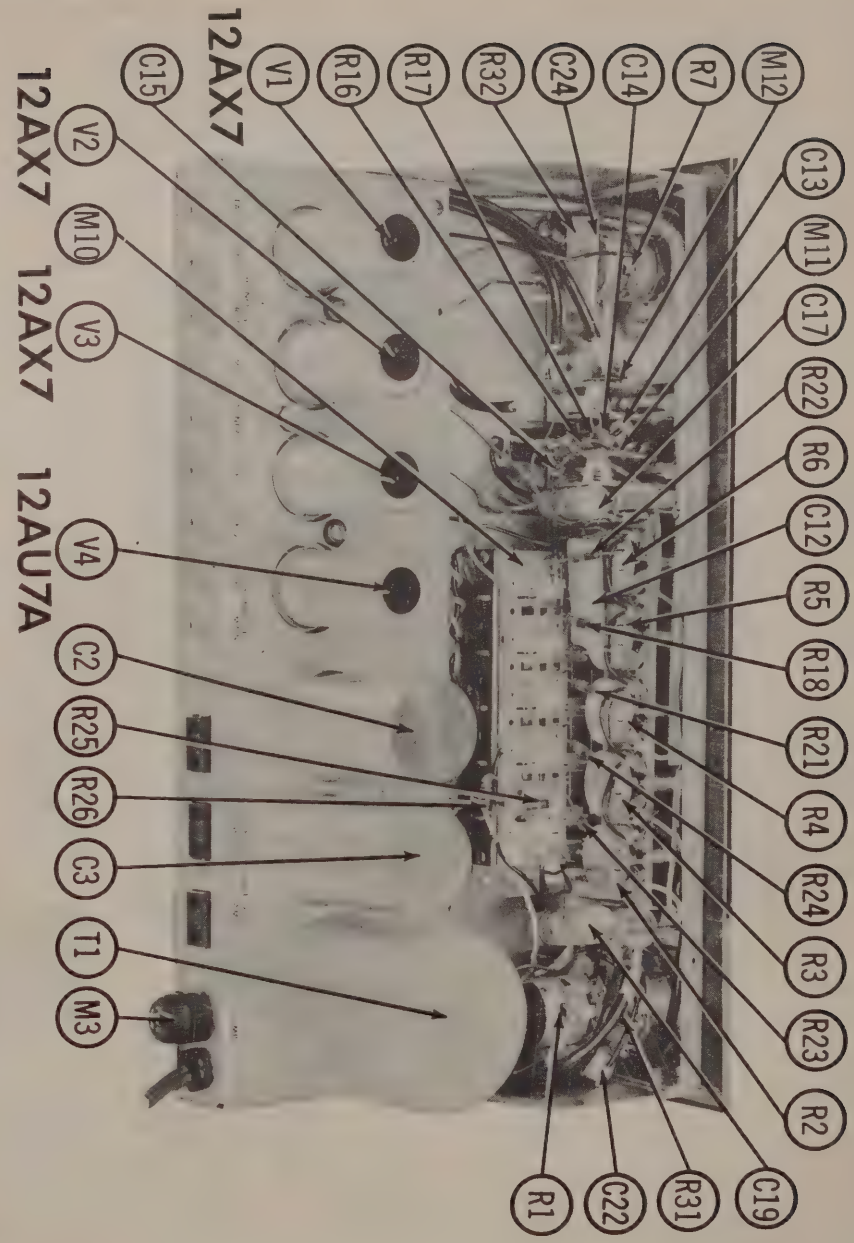
Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	FISHER PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C6	100		CC21GP101M5	NPO-SI100	TCZ-100	TZ30	NPO-337-101	ZT-531	5TCC-T1	
C7	02	200	C68P223M2	BPD-02	DD-203	CUB2S2	817-02	PT412	2TM-S2	
C8	220		CC21GP221K5	NPO-SI220	TCZ-220	TZ38	NPO-335-221		5TCC-T22	
C9	120		CC21GP121K5	NPO-SI120	TCZ-120	TZ32	NPO-333-121		5TCC-T12	
C10	440		CC21GP441K5							
C11	10000		CK62GP103V6	BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C12	.047	400	C68P473M4	BPD-05	DF-503	CUB4S47		PT4147	4TM-S47	
C13	.0022	200	C68P222K2	1464-0022		1R5D22			MS-222	
C14	.0033	200	C68P332K2	1464-0033		1R5D33			MS-233	
C15	720		CC21GP721K5							
C16	10000		CK62GP103V6	BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C17	.047	400	C68P473M4	BPD-05	DF-503	CUB4S47			4TM-S47	
C18	300		CC21GP221K5		TCZ-300	TZ41	NPO-335-301			Note 2
C19	.1	200	C68P104V2	P288N-1	DF-104	CUB2P1		PT401	2TM-P1	
C20	470		CC21GP471K5	SI470	D6-471	TP46	811-471		5GA-T47	
C21	.02	200	C68P203K2							
C22	.02	200	C68P203K2							
C23	1000		CC26GP102K5	1464-001		1R5D1	811-102	MCB255	MS-21	
C24A	4700	♦								
B	4700	♦	PC-531-128							
C	100	♦								
C25	220		CC21GP221K5	NPO-SI220	TCZ-220	TZ38	NPO-335-221		5GA-T22	
C26	.1	400	C68P104M4	P488N-1	DF-104	CUB4P1		PT401	4TM-P1	
C27	68		CC21GP680K5	NPO-SI68	TCZ-68	TZ26	NPO-337-680		5TCC-Q68	
C28	.0047	200	C68P472M2	SI4700	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	

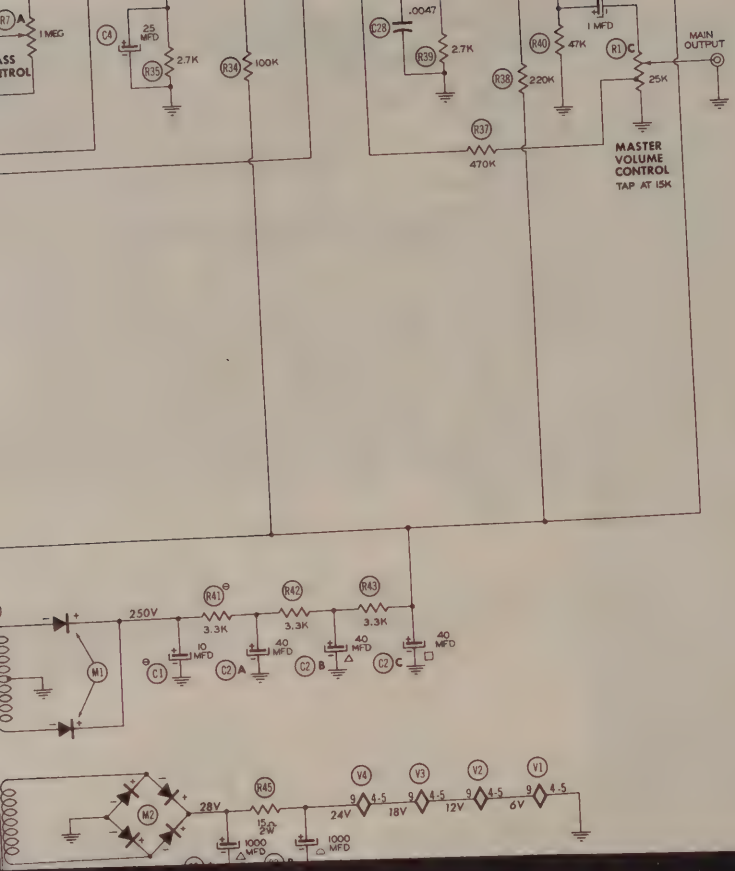
Note 2. Some versions may use 220MMF in this application

♦ Items C24A, C24B, C24C, R32A, R32B, R32C and R32D are combined in one unit.

CHASSIS—TOP VIEW



CHASSIS—BOTTOM VIEW



	Pin 7	Pin 8	Pin 9
	2.2Meg	2.7KΩ	3Ω
	18Meg	0Ω	6Ω
	200KΩ	2.7KΩ	9Ω
	† 230KΩ	47KΩ	12Ω

CONTROL SWITCH

TRADE NAME	Masco Models HCM, PCM ("Electronic Butler")
MANUFACTURER	Mark Simpson Mfg. Co., Inc., 32-28 49th Street, L
TYPE SET	AC-DC Operated Intercommunications System
TUBES (Two)	Types 1U5 AF Amplifier, 3V4 Output
POWER SUPPLY	105-125 Volts AC-DC

D-103	K082	811-01	DC-511	5HK-S1	
6-202	K072	GP2-333-202	UC-522	SHK-D2	Note 1
F-104	CUB6P1		PT601	6TM-P1	

.

CONTROLS

CEMENT DATA			
CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
7-5Meg-Z	Q13-141	U-65	Volume
-3	Not Req.	Not Req.	Attach to R1A

RESISTORS

OTES	ITEM No.	RATING		REPLACEMENT DATA		NOTES
		OHMS	WATT	MASCO PART No.	IRC PART No.	
ote 1	R7	2000Ω	8		PW10-2000	
	R8	18Ω	1			
	R9	470Ω	2		BTB-470	
	R10	4700Ω	½		BTS-4700	
	R11	47KΩ	½		BTS-47K	
	R12	47KΩ	½		BTS-47K	

e a 120Ω 1/2 watt resistor in this application.

ORMER (INPUT)

	REPLACEMENT DATA					
IASCO RT No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
		A-2918			S-11X

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	MASCO PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	9.3KΩ	45Ω	T-2-B	Z1000		A-3856		S-51X	

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	MASCO PART No.	QUAM PART No.	RCA TYPE No.	
SP1	3½"	PM	45Ω	1403	4A07Z45		

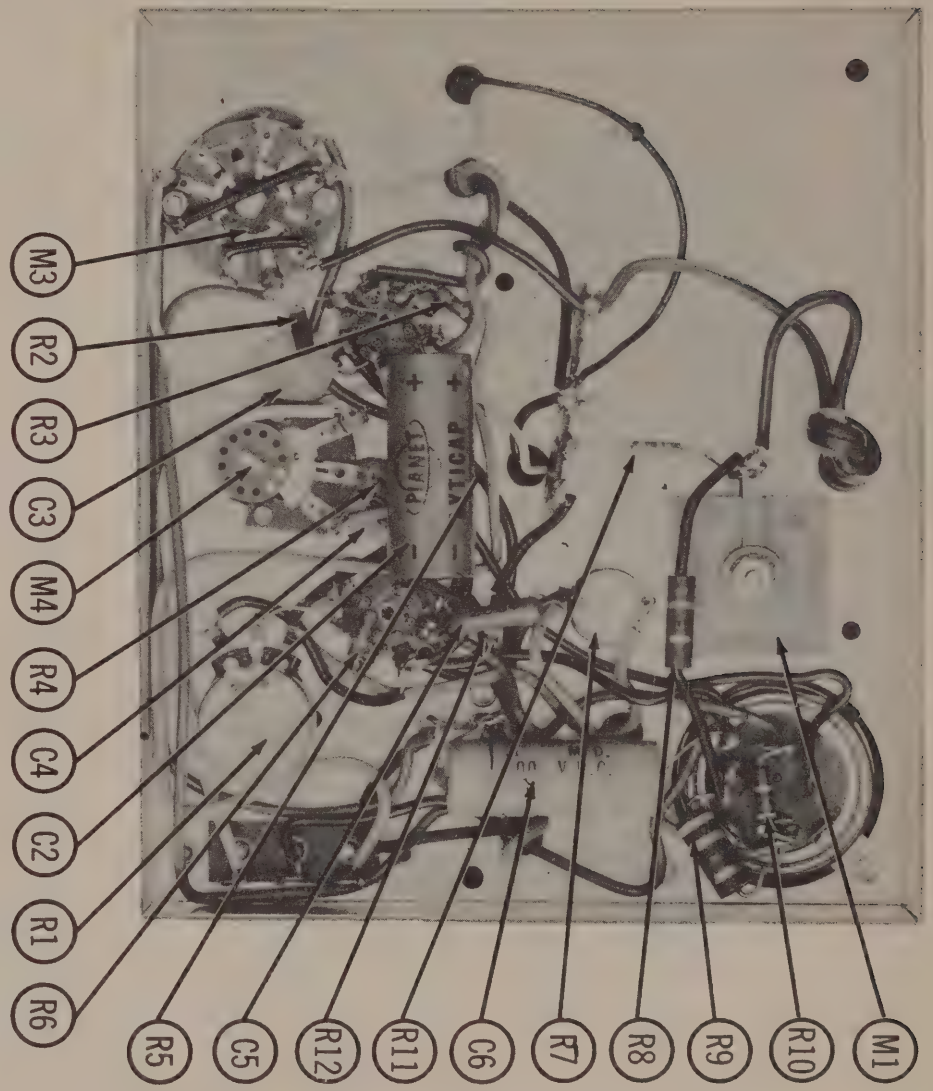
SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	MASCO PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.067ADC		1004A	RS100	6S100	5M1	100	

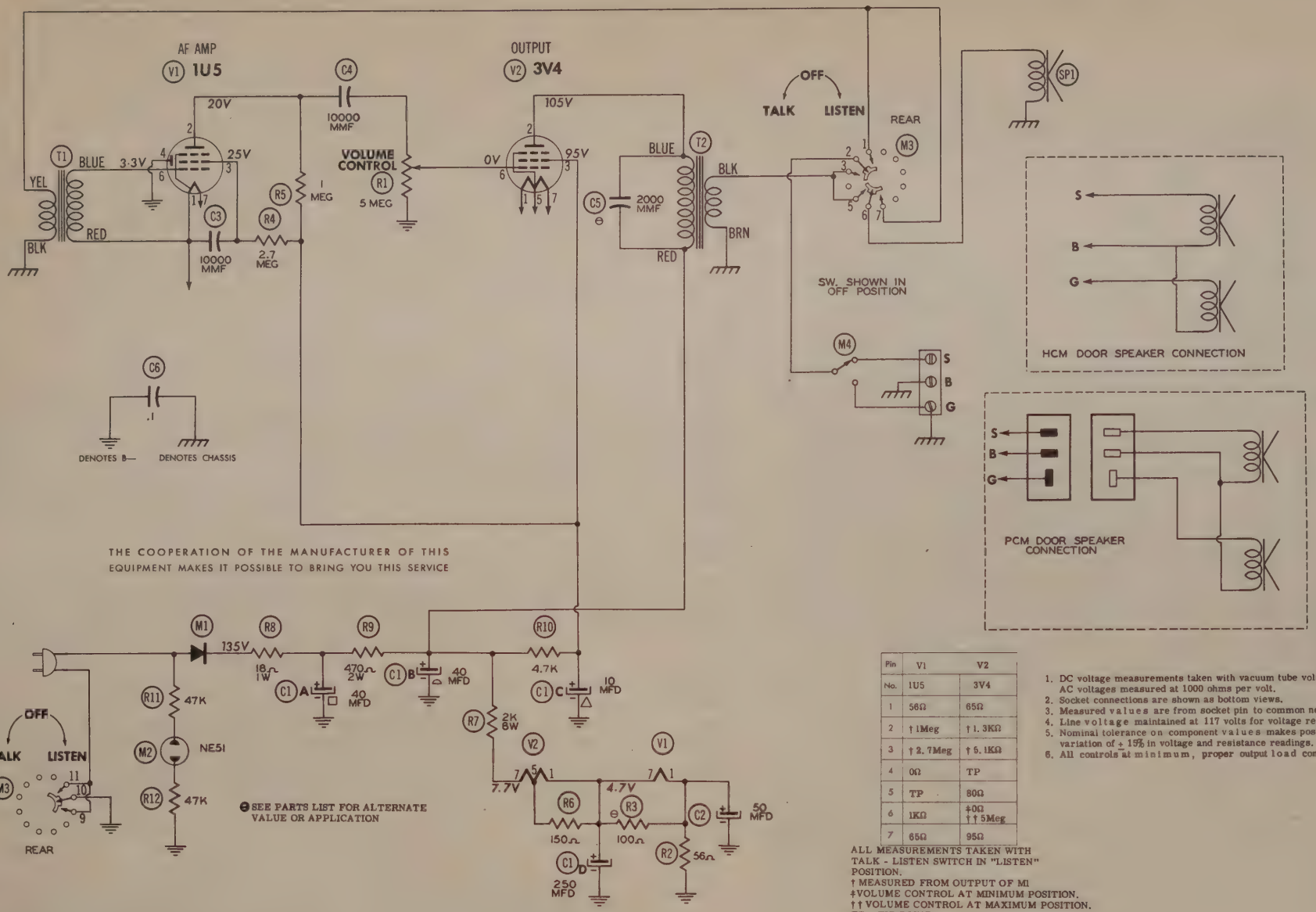
MISCELLANEOUS

ITEM No.	PART NAME	MASCO PART No.	NOTES
M2	Pilot Light		NE51
M3	Switch	1838	Talk - Listen (Rotary - Wafer Type; 3 Pole, 3 Position)
M4	Switch	1839	Selector (SPDT)

CHASSIS—BOTTOM VIEW



MASCO MODEL HCM



Pin No.	V1 1U5	V2 3V4
1	56Ω	65Ω
2	†1Meg	†1.3KΩ
3	†2.7Meg	†6.1KΩ
4	0Ω	TP
5	TP	80Ω
6	1KΩ	‡0Ω ††5Meg
7	65Ω	95Ω

ALL MEASUREMENTS TAKEN WITH TALK - LISTEN SWITCH IN "LISTEN" POSITION.
† MEASURED FROM OUTPUT OF M1
‡ VOLUME CONTROL AT MINIMUM POSITION.
†† VOLUME CONTROL AT MAXIMUM POSITION.
TP - TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

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PHOTOFACT* Folder

*TRADE MARK

MOTOROLA MODELS Y21K38, B, Y21T25CH, PK, TN, 21K38, B, 21T25CH, PK, TN (Ch. TS-530, Y)

IMPORTANT FILING NOTICE

The contents for this envelope will be found among the last folders in this complete set of folders . . . *unless* it has been purchased as part of a *complete volume* of PHOTOFACTS assembled in a DeLuxe Binder.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

MOTOROLA MODEL 21T25CH

TRADE NAME	Motorola	MODELS	CHASSIS	TUNER
		Y21K38, Y21K38B, Y21T25CH, Y21T25PK, Y21T25TN	TS-530Y	TT-78 (VHF), QTT-37 (UHF)
		21K38, 21K38B, 21T25CH, 21T25PK, 21T25TN	TS-530	TT-77 (VHF only)
MANUFACTURER	Motorola, Inc., 4545 Augusta Blvd., Chicago 51, Illinois			
TYPE SET	Television Receiver			
TUBES	Seventeen			
POWER SUPPLY	110-120 Volts AC-60 Cycles	RATING 1.25 Amp. @ 117 Volts AC		
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)			

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MOTOROLA MODELS Y21K38, B, Y21T25CH, PK, TN, 21K38, B, 21T25CH, PK, TN (Ch. TS-530, Y)

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DISASSEMBLY INSTRUCTIONS

CABINET REMOVAL

1. Remove 1 metal screw. Remove rear cover.

2. Disconnect speaker plug.

3. Remove 1 metal screw from "L" shaped tie down strip at the upper rear portion of the chassis.

4. Remove 4 metal screws from safety glass retainer plates and remove safety glass.

5. Remove 2 metal screws from behind retainer plate.

6. Remove 6 metal screws holding bottom pan to cabinet.

7. Remove cabinet shell from chassis bottom pan.

8. Remove 4 speaker nuts. Remove speaker.

NOTE: If it is necessary to remove the chassis for servicing it is also necessary to remove the speaker. The speaker is the electro-magnetic type and must be connected for proper operation.

MODELS	CHASSIS
Y21K38, Y21K38B, Y21T25CH, Y21T25PK, Y21T25TN	TS-530Y
21K38, 21K38B, 21T25CH, 21T25PK, 21T25TN	TS-530

MOTOROLA MODELS Y21K38, B, Y21T25CH, PK, TN, 21K38, B, 21T25CH, PK, TN (Ch. TS-530, Y)

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

For touch-up adjustments of VHF tuner oscillator adjustments, it is necessary to remove the chassis from the cabinet. (See disassembly instructions).

PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove 4 metal screws from glass retainers at the top and bottom edges of the safety glass. Remove retainer plates and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 5.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from the rear panel of the chassis. Set the horizontal hold control at the mid-position of its range and adjust the horizontal oscillator slug (L39) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L34) located on top of chassis.

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

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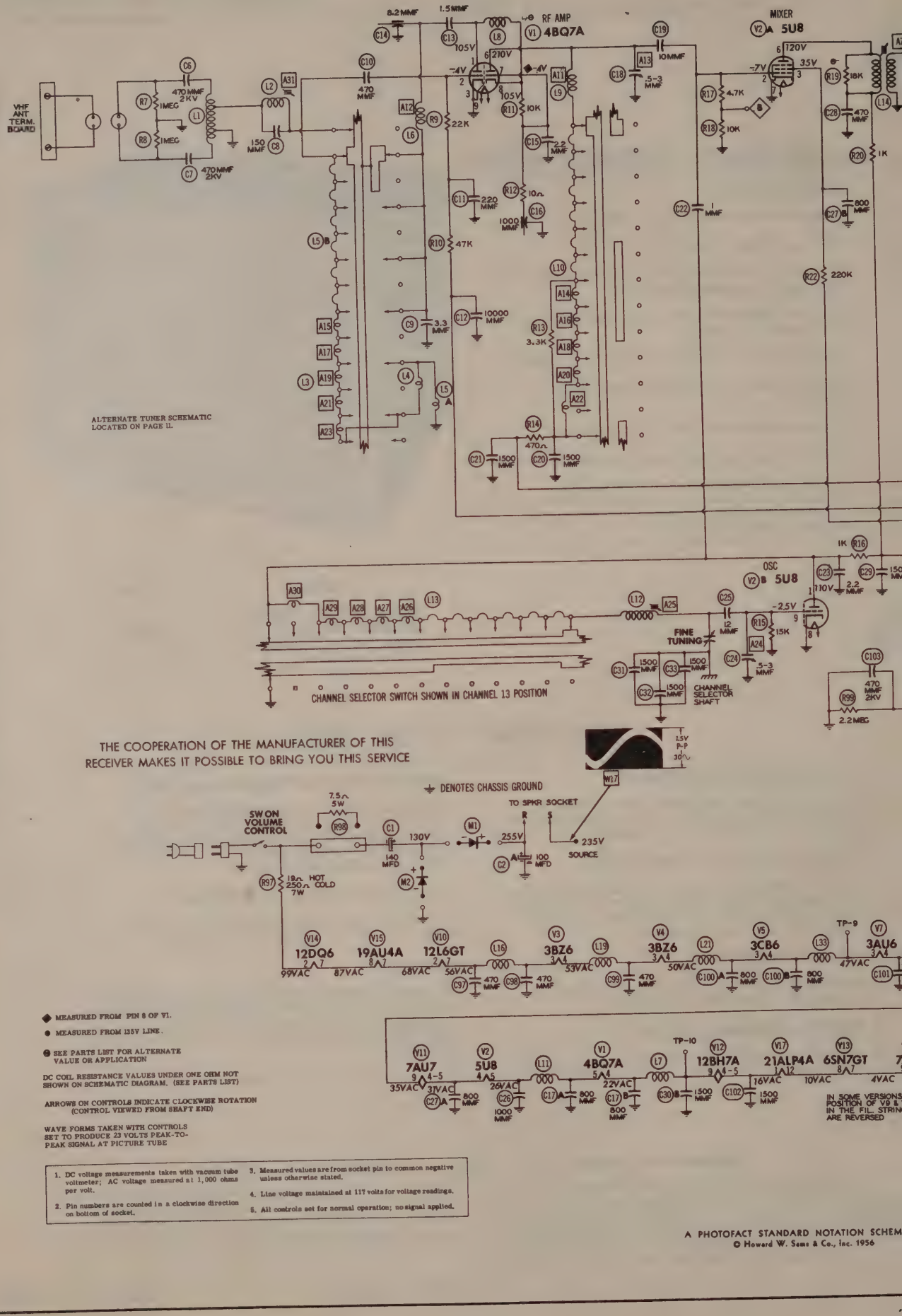
G232

DATE 5-56 SET 315 FOLDER 7


VHF ANT. TERM. BOARD
RF AMP
V1 4BQ7A
MIXER
V2A 5U8
OSC
V2B 5U8
ALTERNATE TUNER SCHEMATIC LOCATED ON PAGE 11.
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION
FINE TUNING
CHANNEL SELECTOR SHAFT
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
DENOTES CHASSIS GROUND
TO SPKR SOCKET
SW ON VOLUME CONTROL
HOT COLD
SOURCE
V14 12DQ6
V15 19AU4A
V10 12L6GT
V3 3BZ6
V4 3BZ6
V5 3CB6
V7 3AU6
V11 7AU7
V2 5U8
V1 4BQ7A
V12 12BH7A
V17 21ALP4A
V13 6SN7GT
TP-9
TP-10
◆ MEASURED FROM PIN 8 OF V1.
● MEASURED FROM 135V LINE.
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM. (SEE PARTS LIST)
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 23 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE
IN SOME VERSIONS POSITION OF V9 & IN THE FIL. STRIN ARE REVERSED
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltage measured at 1,000 ohms per volt.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation; no signal applied.

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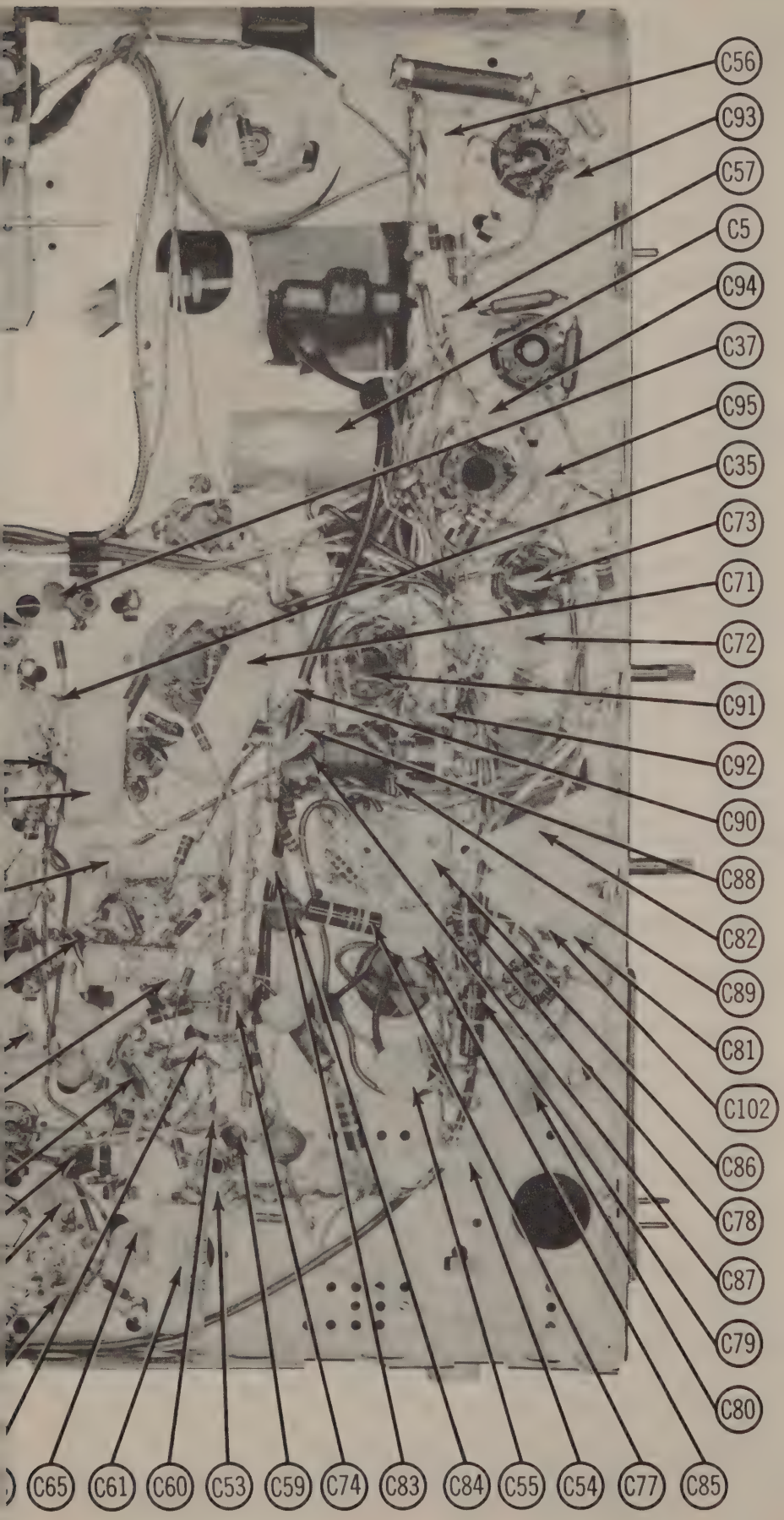
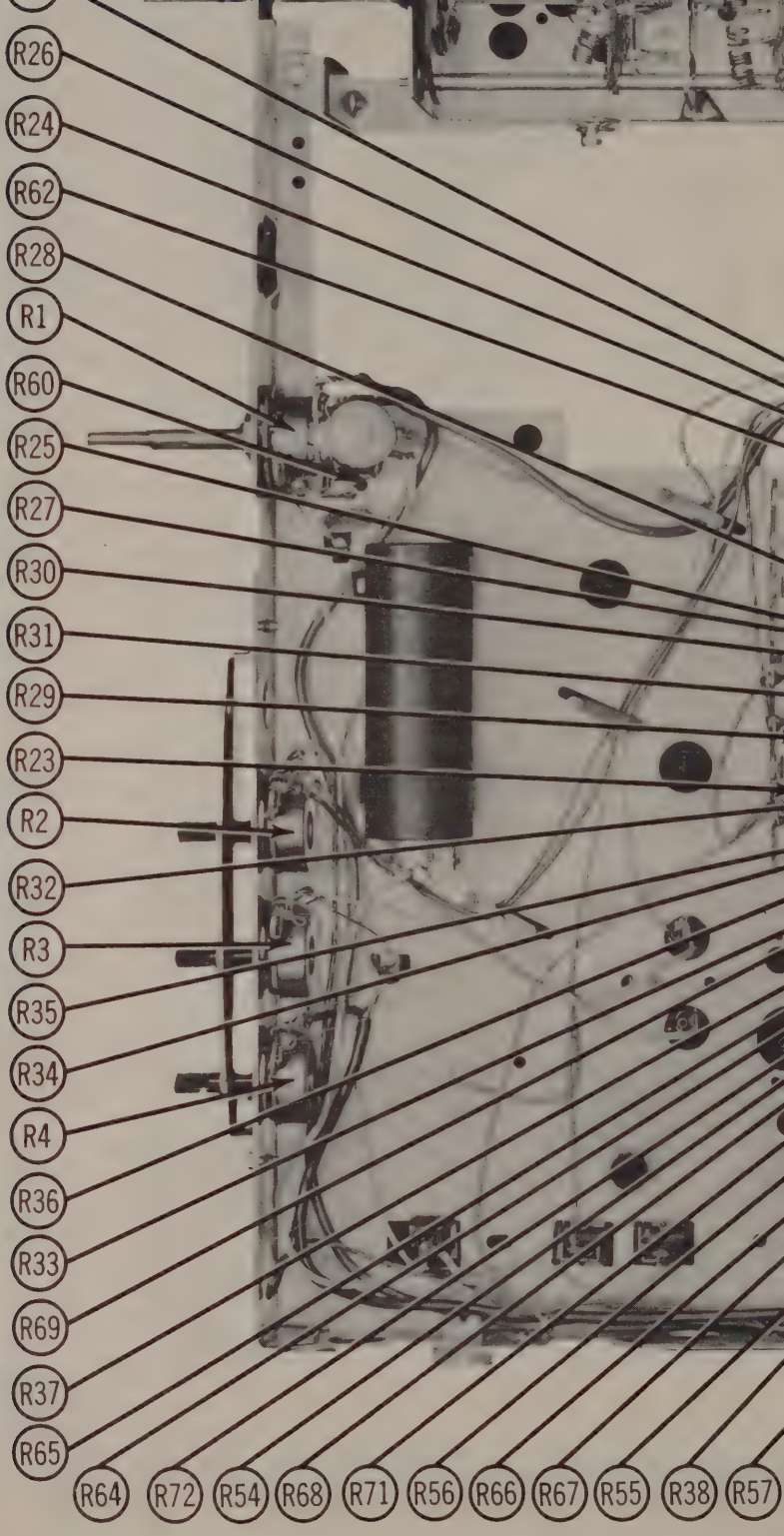


ACITOR IDENTIFICATION


R26
R24
R62
R28
R1
R60
R25
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R30
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R2
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R34
R4
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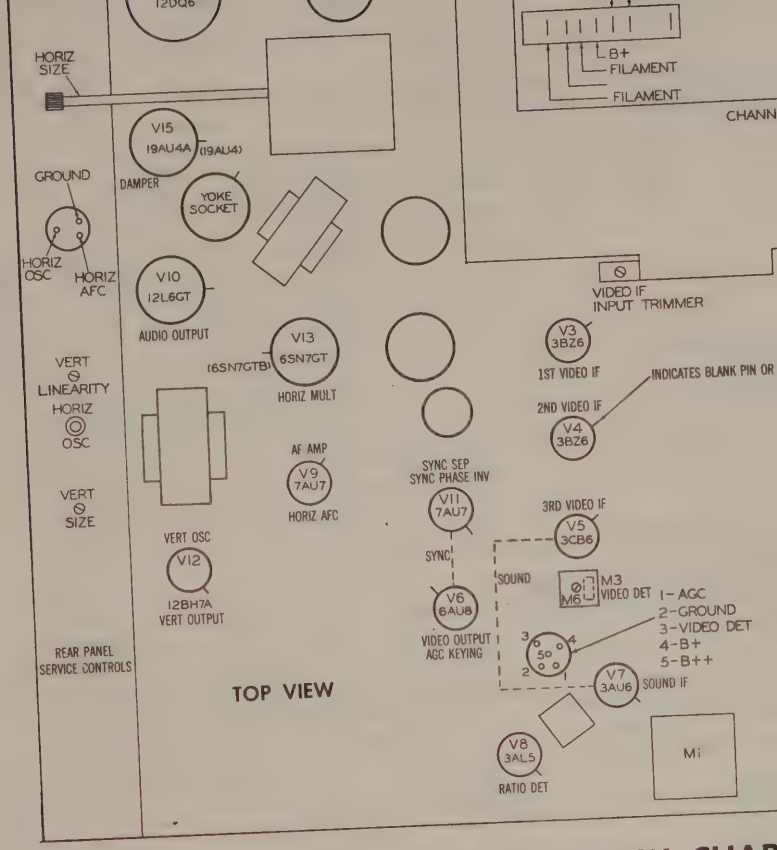
R57



TUBE FAILURE CHECK CHAR

The following chart lists tubes whose failures are most likely to produce the
Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound -**Selenium Rectifiers (M1 & M2)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster -**V2, V3, V4, V5, V10**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V6, V17**
Has pic, no sound - **V7, V8, V9, V10**
Overloaded picture - **V6**

SYNC FAILURE
No vert. sync - **V11, V12**
No horiz. sync - **V9, V11, V13**
No vert. or horiz. sync - **V11**

SWEEP FAILURE
No raster, has sound - **V13, V14, V15, V16, V17**
No vertical deflection - **V12**

in series from point Ⓒ

AL ATOR NCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
Mod)	Any non-interfering channel	DC probe to point Ⓒ. Common to chassis.	A8, A9	Adjust for maximum deflection with VTVM set to 5 volt scale. Attenuate generator as necessary.
	"	DC probe to point Ⓓ. Common to point Ⓔ.	A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.
ast before limiting.

VEEP ERATOR UENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
MC KC Swp)	4.5MC	Any non-interfering channel	Vert. Amp. to point Ⓒ. Low side to chassis.	A8, A9	Disconnect stabilizer capacitor (C4B). Adjust for curve of maximum amplitude and symmetry as in Fig. 4.
"	"	"	Vert. Amp. to point Ⓓ. Low side to chassis.	A10	Reconnect C4B. Adjust A10 so that 4.5MC marker appears at center of crossover lines as in Fig. 5. SLIGHTLY retouch A9 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ALIGNMENT

ion.

GNAL NERATOR QUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
5MC nmod)	Any non-interfering channel	DC probe thru detector (Fig.6) to pin 11 (cathode) of picture tube. Low side to chassis.	A32	Adjust for MINIMUM deflection on VTVM.

ALTERNATE 4.5MC TRAP ALIGNMENT

fine tuning control until a noticeable 4.5MC beat appears in the picture. Adjust A11 for
Adjust A11 so that the core is approximately centered between the two points where the 4.5MC

TRUCTIONS

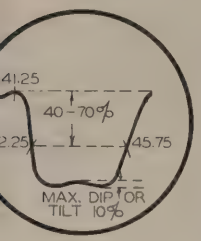


FIG. 2

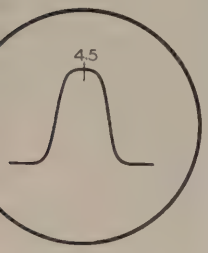
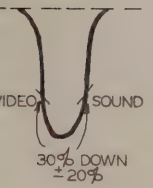
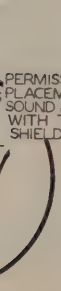


FIG. 4





VHF RF AND MIXER ALIGNMENT

Adjust the oscilloscope for a two inch deflection with 1½ volt peak to peak signal. If sweep generator has no built in marker, loosely couple a separate marker generator to the antenna terminals.
Adjustments A11, A12 and A14 thru A23 are adjusted by expanding or compressing coil turns.
Ground RF AGC line by connecting clip lead from positive side of C12 to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 47K to point Ⓑ. Low side to chassis.	A11, A12	Adjust A11 and A12 for maximum amplitude and response curve similar to Fig. 7.
9.	"	"	177MC (10MC Swp)	175.25MC 179.75MC	7	"	A13	Adjust for maximum amplitude, correct tilt and correct marker position as in Fig. 7.
10	"	"	207MC (10MC Swp)	205.25MC 209.75MC	12	"		Check response curve on each channel. If response is not within limits on each channel, repeat steps 8 and 9. If necessary, make compromise adjustments on A11, A12 and A13.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
11.	"	"	85MC (10MC Swp)	83.25MC 87.75MC	6	"	A14, A15	Adjust A14, then A15 for maximum gain, proper tilt and markers in proper position as in Fig. 8.
12.	"	"	79MC (10MC Swp)	77.25MC 81.75MC	5	"	A16, A17	Adjust A16 and A17 in that order for maximum gain, proper tilt and correct marker positions as in Fig. 8.
13.	"	"	69MC (10MC Swp)	67.25MC 71.75MC	4	"	A18, A19	Adjust for maximum gain, proper tilt and proper marker position.
14.	"	"	63MC (10MC Swp)	61.25MC 65.75MC	3	"	A20, A21	Adjust for maximum amplitude, proper tilt and proper marker position.
15.	"	"	57MC (10MC Swp)	55.25MC 59.75MC	2	"	A22, A23	Adjust for maximum amplitude, proper tilt and proper marker positions. Remove clip lead between positive side of C12 and chassis.

VHF OSCILLATOR ALIGNMENT

Replace the 6 volt bias as under "Video IF Alignment". Use only enough sweep generator output to produce useable pattern on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
16.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	195MC (10MC Swp)	197.75MC	10	Vert. Amp. thru 47KΩ to point Ⓐ. Low side to chassis.	A24	Adjust A24 to place sound marker in sound trap as in Fig. 9.
17.	"	"	213MC (10MC Swp)	215.75MC	13	"	A25	Check channels 7 thru 13 noting if sound marker for each channel falls just above the trap notch. If more than 40 degrees rotation of the fine tuning is required to place the sound marker in the proper position on any high band channel, set tuner sweep and marker generator for channel 13 frequencies and adjust A25 to place marker in proper position. Then set tuner, sweep generator and marker generator for channel 10 frequency and readjust A24 to place marker in proper position as in Fig. 9.
			207MC (10MC Swp)	209.75MC	12			
			201MC (10MC Swp)	203.75MC	11			
			195MC (10MC Swp)	197.75MC	10			
			189MC (10MC Swp)	191.75MC	9			
			183MC (10MC Swp)	185.75MC	8			
			177MC (10MC Swp)	179.75MC	7			
18.	"	"	85MC (10MC Swp)	87.75MC	6	"	A26	Adjust to place sound marker in sound trap as seen in Fig. 9. A26 thru A30 are adjusted by compressing and expanding coil turns.
			79MC (10MC Swp)	81.75MC	5		A27	
			69MC (10MC Swp)	71.75MC	4		A28	
			63MC (10MC Swp)	65.75MC	3		A29	
			57MC (10MC Swp)	59.75MC	2		A30	

UHF TUNER ALIGNMENT FOR TUNER TT37

The UHF portion of this receiver has been properly aligned at the factory and is very stable.
UHF tuner alignment is not recommended in the field.

45.0 MC TRAP ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
19.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	45MC (10MC Swp)	45MC	2	Vert. Amp. thru 47KΩ to point Ⓐ. Low side to chassis.	A31	Adjust A31 for MINIMUM response at 45MC marker.

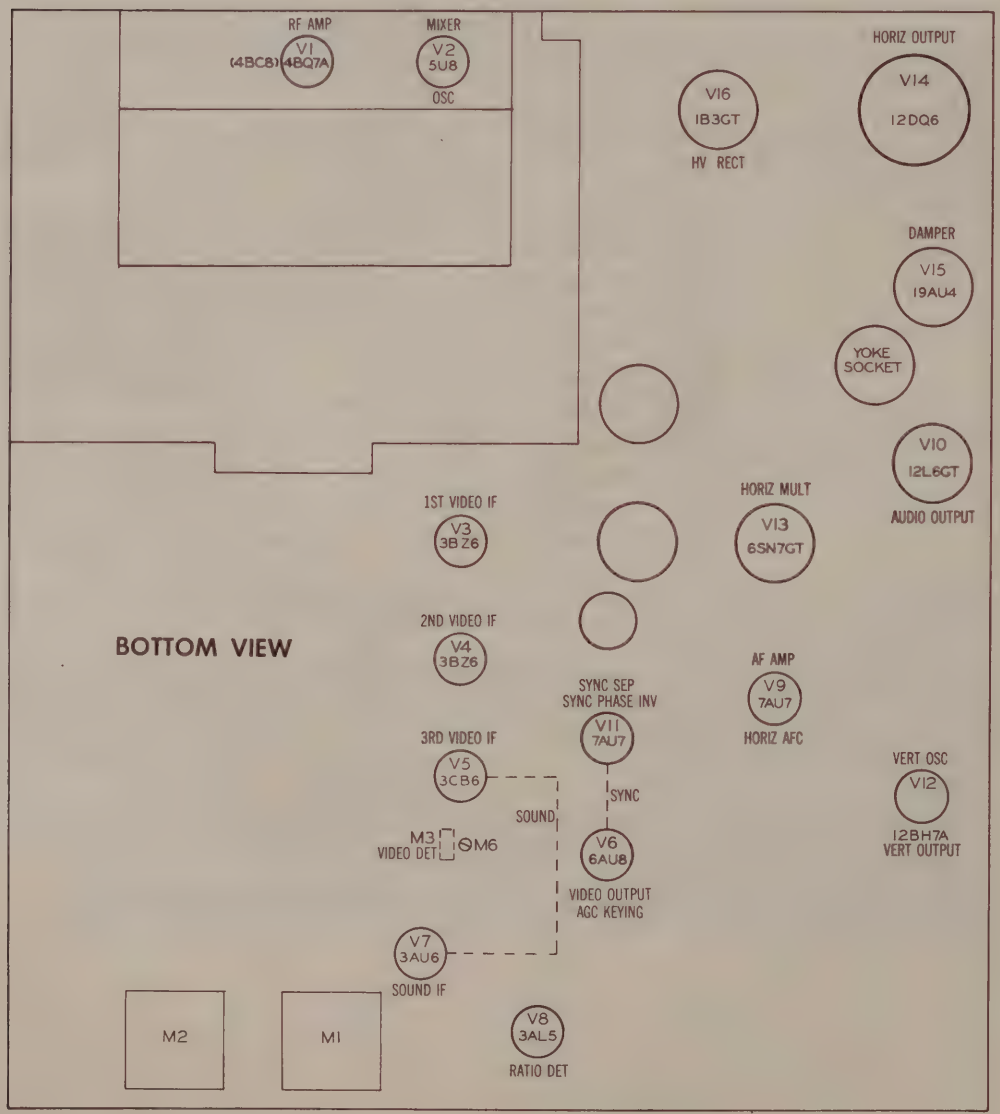
IF SENSITIVITY MEASUREMENT

Set the contrast control for minimum contrast. Disable the horizontal sweep circuit as under "Pre - Alignment Instructions". Set channel selector to channel 13. Connect the high side of an AM signal generator thru a .001MFD capacitor to pin 1 (grid) of the first Video IF amplifier tube (V3). Low side to chassis. Set signal generator to 45.0MC.
Connect the DC probe of a VTVM to point Ⓐ. Common to chassis.
A signal of less than 400 microvolts from the generator should produce 1 volt on the VTVM. Short out R17 with a clip lead and move high side of signal generator to point Ⓑ. Low side to chassis. A signal of less than 60 microvolts from the generator should produce 1 volt on the VTVM. Remove short from R17.

RESISTANCE MEASUREMENTS

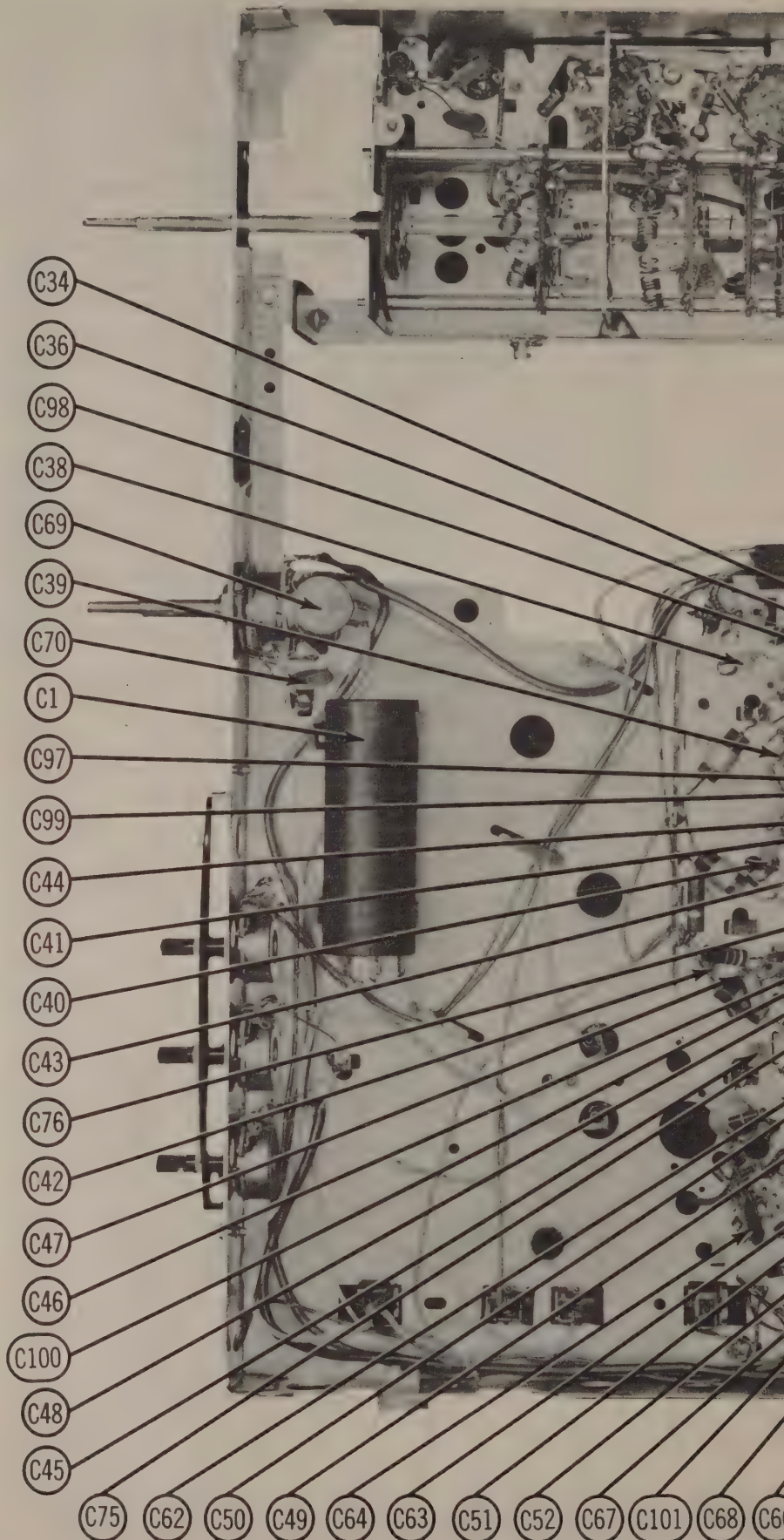
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	4BQ7A	INF	2Meg	0Ω	5Ω	6Ω	† 2.1KΩ	INF	INF	0Ω
V 2	5U8	■ 2KΩ	15KΩ	■ 220KΩ	7Ω	6Ω	■ 2KΩ	0Ω	0Ω	15KΩ
V 3	3BZ6	330KΩ	47Ω	14Ω	13Ω	† 6.8KΩ	† 6.8KΩ	0Ω		
V 4	3BZ6	330KΩ	47Ω	13Ω	12Ω	† 6.8KΩ	† 6.8KΩ	0Ω		
V 5	3CB6	1.2KΩ	120Ω	12Ω	11Ω	† 8.2KΩ	† 39KΩ	0Ω		
V 6	6AU8	60KΩ	■ 220KΩ	1.2Meg	8Ω	9Ω	5Ω	3.9KΩ	■ 1.5KΩ	■ 10KΩ
V 7	3AU6	2.2KΩ	0Ω	11Ω	10Ω	■ 2.2KΩ	■ 2.2KΩ	150Ω		
V 8	3AL5	INF	INF	10Ω	9Ω	22KΩ	0Ω	0Ω		
V 9	7AU7	† 33KΩ	300KΩ	1.5KΩ	0Ω	0Ω	22KΩ	300KΩ	120KΩ	1Ω
V 10	12L6GT	TP	17Ω	† 400Ω	† 82Ω	† 33KΩ	NC	14Ω	60KΩ	
V 11	7AU7	■ 1Meg	1.8Meg	5Ω	7Ω	7Ω	■ 9.5KΩ	22KΩ	2.2KΩ	8Ω
V 12	12BH7A	▲ 900Ω	▲ 2.7Meg	7.5KΩ	3Ω	3Ω	▲ 2.7Meg	550KΩ	50Ω	5Ω
V 13	6SN7GT	120KΩ	† 75KΩ	1KΩ	5Meg	† 11KΩ	1KΩ	1Ω	2Ω	
V 14	12DQ6	TP	23Ω	TP	■ 470Ω	680KΩ	TP	20Ω	0Ω	TOP CAP ▲ 32Ω
V 15	19AU4A	NC	TP	350KΩ	NC	† 85Ω	TP	17Ω	20Ω	
V 16	1B3GT		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲ 272Ω
V 17	21ALP4A	3Ω	■ 2.5Meg	PIN 6 ▲ 20Ω	PIN 10 ▲ 20Ω	PIN 11 ■ 120KΩ	PIN 12 2Ω			

† MEASURED FROM OUTPUT OF M1.
■ MEASURED FROM 135V LINE.
▲ MEASURED FROM PIN 3 OF V15.
TP-TIE POINT.
NC-NO CONNECTION.

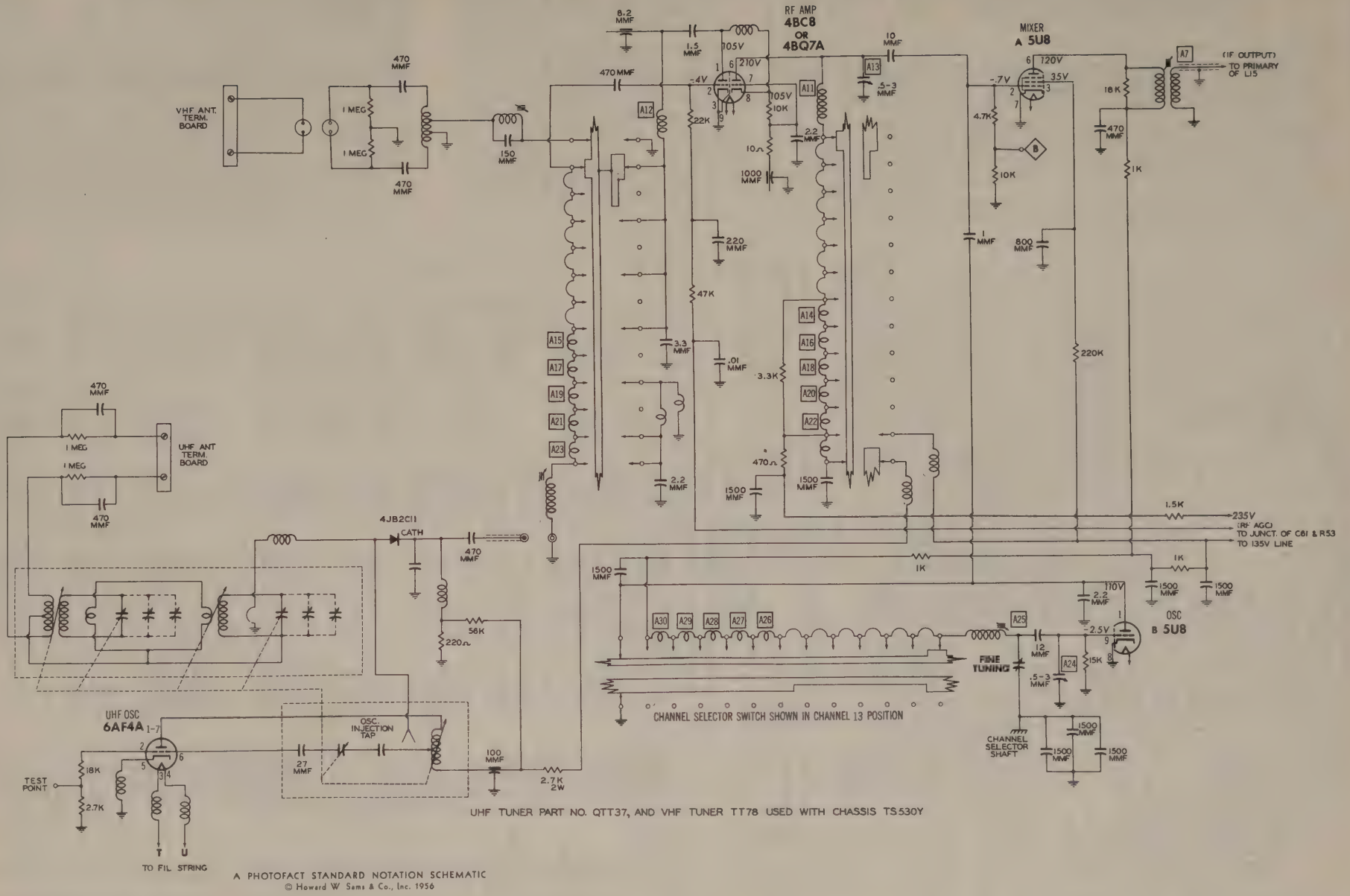


TUBE PLACEMENT CHART

R47
R92
R96
R45
R44
R94
R80
R63
R61
R90
R89
R5
R77
R76
R87
R6
R74
R88
R86
R75



CHASSIS BOTTOM VIEW



UHF TUNER PART NO. QTT37, AND VHF TUNER TT78 USED WITH CHASSIS TS530Y

ALTERNATE UHF-VHF TUNER SCHEMATIC

MOTOROLA MODELS V21K38, B, V2112SCH, PK, TN, 21K38, B, 2112SCH, PK, TN (Ch. TS-530, Y)

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	NOTES
V1	RF Amplifier	4BQ7A	4BQ7A	4BC8 may be used as an alternate
V2	Mixer-Oscillator	5U8	5U8	
V3	1st. Video IF Amplifier	3BZ6	3BZ6	
V4	2nd. Video IF Amplifier	3BZ6	3BZ6	
V5	3rd. Video IF Amplifier	3CB6	3CB6	
V6	Video Output-AGC Keying	6AU8	6AU8	
V7	Sound IF Amplifier	3AU6	3AU6	
V8	Ratio Detector	3AL5	3AL5	
V9	AF Amplifier-Horiz. AFC	7AU7	7AU7	
V10	Audio Output	12L6GT	12L6GT	
V11	Sync Separator-Sync Phase Inverter	7AU7	7AU7	
V12	Vert. Oscillator-Vert. Output	12BH7A	12BH7A	
V13	Horiz. Mult.	6SN7GT	6SN7GT	6SN7GTB may be used as an alternate
V14	Horiz. Output	12DQ6	12DQ6	
V15	Damper	19AU4A	19AU4A	19AU4 may be used as an alternate
V16	HV Rectifier	1B3GT	1B3GT	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: MOTOROLA PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	NOTES
V17	21ALP4A	21ALP4A ① 21ALP4B ① 21ALP4	21ALP4A ① 21ALP4	21ALP4A ② 21ALP4B ② 21ALP4A/B ② 21ALP4	① Aluminized ② Silver screen "85"

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: MOTOROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	140	150	23B484097	AFHS1-70	XA004	FP117	TM-140-150	T-055	TVL-1428
C2A	▲100	300	23B731620			FP326.3	TM-3136	Q-162	
B	■200	150							
C	▲60	150							
C3A	▲200	150	23B710941	AFHS2-109	B078	FP216.1	TM-2029	D-088	TVL-2444
B	▲5	150							
C4A	■10	150	23B736969			FP231	TM-T10-300	D-200	TVL-2510
B	4	50				TC30		MT-1504	TVA-1303
C	▲10	50							
C5	20	450	23K710667	PRS450V20	BR2045	TC75	TD-20-450	FM-4520	TVA-1709

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: MOTOROLA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C6	470	2000	21R121478	HVD-30-470	DD30-471	V2T47	3KV-471	DC30347	20GA-T47	
C7	470	2000	21R121478	HVD-30-470	DD30-471	V2T47	3KV-471	DC30347	20GA-T47	
C8	150		21R121228	N750-D1150	TCN-150	N046	N750-337-151		5TCU-T15	
C9	3.3		21R115951	NP0-SI3.3	TCZ-3R3	Z008	NP0A-3R3	ZT-5533	5TCCB-V33	
C10	470		21R115856	SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C11	220		21R410115	DI-00022	DD-221	TP39	811-221	UC-5322	5GA-T22	
C12	10000		21R482726	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C13	1.5		21R115959	NP0-SI1.5	TCZ-1R5	TZ04	NP0A-1R5	ZT-5515	5TCCB-V15	
C14	8.2		21R122084							
C15	2.2		21R115948	NP0-SI2.2	TCZ-2R2	TZ05	NP0A-2R2		5TCCB-V22	
C16	1000		21R120672	EF-001	MFT-1000				503C-D1	
C17A	800		21R400943	BPD-0008	DD2-102	K067	812-001	DCD-521	5GA-T8	
B	800			BPD-0008		K067			5GA-T8	
C18	.5-3		21K735985		829-3		3115-01-0R5	CT565A		
C19	10		21R121114	BPD-00001	DD-100	G018	831-100	UC-541	5GA-Q1	
C20	1500		21R120100	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C21	1500		21R120100	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C22	1		21R114071	NP0-SI1	TCZ-1	TZ03	NP0A-010		5TCCB-V1	
C23	2.2		21R115948	NP0-SI2.2	TCZ-2R2	TZ05	NP0A-2R2		5TCCB-V22	
C24	.5-3		21K735985		829-3		3115-01-0R5	CT565A		
C25	12		21R121110							
C26	1000		21R115386	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C27A	800		21R400943	BPD-0008	DD2-102	K067	812-001	DCD-521	5GA-T8	
B	800			BPD-0008		K067			5GA-T8	
C28	470		21R114554	BPD-00047	DD-471	K060	831-471	UC-5347	5GA-T47	
C29	1500		21A737425	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C30A	1500		21R120098	BPD-2X004	DD2-152	DK071	812-0015	DCD-5215	5HK-2D15	
B	1500									
C31	1500		21A737425	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C32	1500		21A737425	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C33	1500		21A737425	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C34	470		21R114554	BPD-00047	DD-471	K060	831-471	UC-5347	5GA-T47	
C35	470		21R114554	BPD-00047	DD-471	K060	831-471	UC-5347	5GA-T47	
C36	.75		21K735623							
C37	22		21R120539							
C38	1000		21R122549		MFT-1000					
C39	1000		21R115386	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C40	560		21R120936	DI-00056	DD-561	G063	811-561	UC-5356	5GA-T56	
C41	470		21R114554	BPD-00047	DD-471	K060	831-471	UC-5347	5GA-T47	
C42	470		21R114554	BPD-00047	DD-471	K060	831-471	UC-5347	5GA-T47	
C43	1000		21R115386	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C44	.25	100	8K122045	P288N-25		CUB2P25		PT4025	2TM-P25	
C45	1000		21R115386	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C46	1000		21R115386	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C47	22		21R120539							
C48	22		21R120539							
C49	.1	200	8R121573	P288N-1	DF-104	CUB2P1		PT401	2TM-P1	
C50	3.9		21R115953							
C51	5000		21R115312	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C52	68		21R400930	BPD-000068	DD-680	G038	801-680	UC-5468	5GA-Q68	
C53	27		21R119896							
C54	.1	200	8R121573	P288N-1	DF-104	CUB2P1		PT401	2TM-P1	
C55	5000	2000	21R120093			V2D5			20GA-D5	
C56	.05	400	8R121567	BPD-05	DF-503	CUB4S5		PT415	4TM-S5	
C57	.01	1000	8R121002	P1088N-01	DD-103	CUB16S1		PT611	10TM-S1	Note 1
C58	470		21R114554	BPD-00047	DD-471	K060	831-471	UC-5347	5GA-T47	
C59	3.9		21R122455							
C60	470	2000	21R121478	HVD-30-470	DD30-471	K060	3KV-471	DC30347	5GA-T47	
C61	.25	100	8K122045	P288N-25		CUB2P25		PT4025	2TM-P25	

ITEM No.	RATING: CAP.	RATING: VOLT	MOTOROLA PART No.	AEROVOX PART No.	CENTRALA PART No.
C62	18		21R120578		
C63	10000		21R482726	BPD-01	DD-103
C64	10000		21R482726	BPD-01	DD-103
C65	5000		21R115312	BPD-005	DD-502
C66	470		21R114554	BPD-00047	DD-471
C67	1000		21R115386	BPD-001	DD-102
C68	5000		21R115312	BPD-005	DD-502
C69	3300		21R120422	BPD-0033	D6-332
C70	5000		21R115312	BPD-005	DD-502
C71	.15	400	8R122174	P488N-15	
C72	4700		21R120149	BPD-0047	DD-472
C73	10000	1000	21R122789	P1088N-01	DD-103
C74	4700		21R120149	BPD-0047	DD-472
C75	220		21K122420	SI220	D6-221
C76	.05	400	8R121567	BPD-05	DF-503
C77	.0047	400	8K734634	BPD-0047	D6-472
C78	.0047	400	8K734634	BPD-0047	D6-472
C79	.01	400	8K734633	BPD-01	D6-103
C80	4700		21R120149	BPD-0047	DD-472
C81	.05	400	8R121567	BPD-05	DF-503
C82	.05	400	8R121567	BPD-05	DF-503
C83	470		21R114554	BPD-00047	DD-471
C84	1000		21R115386	BPD-001	DD-102
C85	3300		21R120422	BPD-0033	D6-332
C86	.001	1000	8R122104	HVD-15-1000	DD-102
C87	3300		21R120422	BPD-0033	D6-332
C88	10000		21R482726	BPD-01	DD-103
C89	.0047	400	8K734634	1464-0047	
C90	100		21R400537	NP0-SI100	D6-101
C91	390		21B735757		D6-391
C92	390		21B735757		D6-391
C93	5000		21R115312	BPD-005	DD-502
C94	150	2000	21R122755	HVD-30-150	DD30-15
C95	150	2000	21R122755	HVD-30-150	DD30-15
C96	82	2000	21R120150		DD30-82
C97	470		21R114554	BPD-00047	DD-471
C98	470		21R114554	BPD-00047	DD-471
C99	470		21R114554	BPD-00047	DD-471
C100A	800		21R400943	BPD-0008	DD2-102
B	800			BPD-0008	
C101	5000		21R115312	BPD-005	DD-502
C102	1500		21R120100	BPD-0015	DD-152
C103	470	2000	21R121478	HVD-30-470	DD30-4

Note 1. Some versions use .05MFD in this application (part #8R
Note 2. Some versions use .01MFD in this application (part #8K

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MOTOROLA PART No.	CENTRALAB PART No.	CLAROST PART N
R1A	350Ω	½	18B736125	F1-1	RT V-549
B	1Meg	½		R2-62	
C	Switch			KB-1	
R2A	5Meg	½	18K733415	AB-87	A47-5Meg
B	Shaft		Not Req.	AK-19	RN-3
R3A	850KΩ	½	18K733417	AB-59 ♦	A47-500K
B	Shaft		Not Req.	AK-19	RN-3
R4A	100KΩ	½	18K735220	AB-40	A47-100K
B	Shaft		Not Req.	AK-19	RN-3
R5A	750Ω	½	18K733414	AB-5	A47-750-
B	Shaft		Not Req.	AK-19	RN-3
R6A	6Meg	½	18B733413	AB-87 †	A47-5Meg
B	Shaft		Not Req.	AK-19	RN-3

Note 1. Part No. 18K733220 used in some versions.
♦ Connect a 330KΩ resistor in series with the right hand ter
terminal of the original control (control viewed from shaft en
† Connect a 1Meg resistor in series with the right hand term
terminal of the original control (control viewed from shaft en
* Universal Replacement (Mallory Exact Duplicate Part No.
‡ Concentrikit Equivalent; K-2 Kit, Base Elements and Shaf

RESIST

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: MOTOROLA PART No.	IRC PART No.	NOTES
R7	1Meg	½	6R6004	BTS-1Meg	
R8	1Meg	½	6R6004	BTS-1Meg	
R9	22KΩ	½	6R6028	BTS-22K	
R10	47KΩ	½	6R6056	BTS-47K	
R11	10KΩ	½	6R6054	BTS-10K	
R12	10Ω	½	6R5621	BTS-10	
R13	3300Ω	½	6R6036		
R14	470Ω	½	6R3949	BTS-470	
R15	15KΩ	½	6R2119		
R16	1000Ω	½	6R6301	BTS-1000	
R17	4700Ω	½	6R6039		
R18	10KΩ	½	6R6054	BTS-10K	
R19	18KΩ	½	6R5591		Note 1
R20	1000Ω	½	6R6301	BTS-1000	
R21	1000Ω	½	6R6301	BTS-1000	
R22	220KΩ	½	6R6015		
R23	1500Ω	1	6R5700	BTA-1500	
R24	1000Ω	1	6R6301	BTS-1000	
R25	6800Ω	2	6R5690		Note 2, 3
R26	47Ω	½	6R5550	BTS-47Ω	
R27	18KΩ	½	6R5591	BTS-18K	Note 1
R28	1000Ω	½	6R6301	BTS-1000	
R29	6800Ω	2	6R5690		Note 3
R30	47Ω	½	6R5550	BTS-47	
R31	330KΩ	½	6R2096		
R32	1200Ω	½	6R6393	BTS-1200	
R33	8200Ω	2	6R5725		
R34	1000Ω	½	6R6301		
R35	39KΩ	1	6R5588		
R36	120Ω	½	6R5551	BTS-120	
R37	3900Ω	½	6R5659	BTS-3900	
R38	8200Ω	1	6R5610	BTA-8200	
R39	5600Ω	2	6R5765	BTB-5600	
R40	1500Ω	1	6R5700	BTA-1500	
R41	6800Ω	2	6R5690	BTB-6800	

DESCRIPTIONS

RS (cont)

ORNELL-DUBILIER RT No.	REPLACEMENT DATA: ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
82	811-01	DC-511	5HK-S1	
82	811-01	DC-511	5HK-S1	
80	811-005	DC-525	5HK-D5	
60	831-471	UC-5347	5GA-T47	
69	801-001	DC-521	5HK-D1	
	811-005	DC-525	5HK-D5	
77	811-0033	UC-5233	5HK-D33	
80	811-005	DC-525	5HK-D5	
B4P15		PT4015	4TM-P15	
79	811-0047	DC-525	5HK-D47	Note 2
B16S1		PT1611	10HK-S1	
79	811-0047	DC-525	5HK-D47	
39	GP2K-221	UC-5322	5GA-T22	
B4S5		PT415	4TM-S5	
B6D47	GP2-333-472	PT6247	6TM-D47	
B6D47	GP2-333-472	PT6247	6TM-D47	
B4S1	GP3-333-103	PT411	4TM-S1	
79	811-0047	DC-525	5HK-D47	
B4S5		PT415	4TM-S5	
B4S5		PT415	4TM-S5	
60	831-471	UC-5347	5GA-T47	
69	801-001	DC-521	5HK-D1	
77	811-0033	UC-5233	5HK-D33	
B16D1	IR5KV-102	PT1621	10TM-D1	
77	811-0033	UC-5233	5HK-D33	
82	811-01	DC-511	5HK-S1	
5D47		MCB465	MS-247	
30	801-101	MCB235	5TCC-T1	
5T39	811-391	MCB243	MS-339	
5T39	811-391	MCB243	MS-339	
80	811-005	DC-525	5HK-D5	
T15	3KV-151	MCL315	20GA-T15	
T15	3KV-151	MCL315	20GA-T15	
060	831-471	UC-5347	5GA-T7	
060	831-471	UC-5347	5GA-T47	
060	831-471	UC-5347	5GA-T47	
067	812-001	DCD-521	5GA-T8	
067			5GA-T8	
080	811-005	DC-525	5HK-D5	
071	801-0015	DC-5215	5HK-D15	
2D2	3KV-471	DC30347	20GA-T47	

).
3).

LS

IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
QJ-872 ‡	UF52L	Contrast (Panel)
	UR16-T35 *	Volume Tap at 300K (Rear)
	US-26	Attach to R1B.
Q11-141	TAP56L	Brightness
TQ	Not Req.	Attach to R2A.
Q11-133 ♦	TAP55L	Vertical Hold (Stop at 500KΩ)
TQ	Not Req.	Attach to R3A.
Q11-128	TAP15L	Horizontal Hold-See Note #1.
TQ	Not Req.	Attach to R4A.
Q11-105	TAP75LL	Vertical Linearity
TQ	Not Req.	Attach to R5A.
Q11-141 †	SU-67 †	Vertical Size (Stop at 5Meg)
TQ	Not Req.	Attach to R6A.

of the control , and the lead connecting to the same
minals down).
the control, and the lead connecting to the same
minals down).
3).
1-103, P10-110 (Panel)
3-137X, R21-201 (Rear)
i-1 (Switch)

S

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R42	10KΩ	½	6R6320	BTS-10K	
R43	560Ω	½		BTS-560	Note 4
R44	68KΩ	½	6R6074	BTS-68K	Note 5
R45	10KΩ	½	6R6054	BTS-10K	
R46	2.2Meg	½	6R3927	BTS-2.2Meg	
R47	470KΩ	½	6R6377	BTS-470K	
R48	100KΩ	½	6R6031	BTS-1000	
R49	33KΩ	½	6R6012	BTS-33K	
R50	180KΩ	½	6R6444	BTS-180K	
R51	1Meg	½	6R6046	BTS-1Meg	Note 6
R52	1.2Meg 5%	½	6R5779	BTS-1.2Meg 5%	
R53	8.2Meg 5%	½	6R114114	BTS-8.2Meg 5%	
R54	2200Ω	½	6R6069	BTS-2200	
R55	2200Ω	½	6R6069	BTS-2200	
R56	150Ω	½	6R6373	BTS-150	
R57	220Ω	½	6R6270	BTS-220	
R58	33KΩ	½	6R6410	BTS-33K	
R59	22KΩ	½	6R6397	BTS-22K	
R60	68KΩ	½	6R6001	BTS-68K	
R61	33KΩ 5%	1	6R5758	BTA-33K 5%	
R62	1500Ω 5%	½	6R400459	BTS-1500 5%	
R63	100Ω	½	6R6018	BTS-100	Note 7
R64	1.5Meg	½	6R3966	BTS-1.5Meg	
R65	270KΩ	½	6R6414	BTS-270K	
R66	1Meg	½	6R6046	BTS-1Meg	
R67	560KΩ	½	6R5697	BTS-560K	
R68	22KΩ	½	6R6397	BTS-22K	
R69	6800Ω	½	6R6428	BTS-6800	
R70	2700Ω	½	6R5577	BTS-2700	
R71	2200Ω	½	6R6069	BTS-2200	
R72	22KΩ	½	6R6397	BTS-22K	
R73	10KΩ	½	6R6054	BTS-22K	
R74	5600Ω	½	6R6117	BTS-10K	
R75	100Ω	½	6R6018	BTS-5600	
R76	8200Ω	2	6R5725	BTB-8200	Note 3

RESISTORS (cont)

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R77	82KΩ	½	6R5644	BTS-82K	
R78	560Ω	½	6R6291		
R79	560Ω	½	6R6291		
R80	330KΩ	1	6K122578		
R81	22KΩ	½	6R6397		
R82	100KΩ	½	6R6031		
R83	100KΩ	½	6R6031		
R84	100KΩ	½	6R6031		
R85	4.7Meg	½	6R2122	BTS-4.7Meg	
R86	5600Ω	½	6R6117		
R87	82KΩ	½	6R5644		
R88	68KΩ	½	6R6074	BTS-68K	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R89	6800Ω	½	6R6428		
R90	1000Ω	½	6R6229	BTS-1000	
R91	4700Ω	½	6R6080	BTS-4700	
R92	680KΩ	½	6R6475		
R93	470Ω	1	6R5593	BTA-470	
R94	6800Ω	1	6R40492	BTA-6800	
R95	18Ω	½	6R2031		
R96	3.3Ω	½	17K485412	BW½-3.3	
R97	19Ω Hot 250Ω Cold	7	6A720662		Note 8
R98	7.5Ω	5	17A711500		
R99	2.2Meg	½	6R3927	BTS-2.2Meg	

Note 1. Some versions use a 15KΩ ½W resistor in this application (Mfgr. Part No. 6R6477).
Note 2. Some versions use a 220Ω ½W resistor in this application (Mfgr. Part No. 6R3933).
Note 3. Use with heat dissipating band (Mfgr. Part No. 42A737745) If bands are not used, the wattage rating must be doubled.
Note 4. Some versions use a 680Ω ½W resistor in this application (Mfgr. Part No. 6R6040).
Note 5. Some versions use a 22KΩ ½W resistor in this application (Mfgr. Part 6R6028).
Note 6. Some versions use a 2.2Meg ½W resistor in this application (Mfgr. Part No. 6R6433).
Note 7. Not used in some versions.
Note 8. Temperature compensating.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	Vert. Osc. Trans.	25K736254	B6704	A-3006					
T2	Horiz. Output Trans.	24C736487 ①							
T3	Vert. Output Trans.	25K736255	Z1804	A-3037	222T1	V313	A-8123	26S52	A-102X
T4A	Yoke(90°)Horiz.(24MH)	24D736978 ②	DF607 ④	MDF-92④	235D1 ④	Y90F1843	DY-16A ④	Y-16 ④⑤	Y-41-1 ④
B	Vert. (40MH)	24D736445 ③	⑤⑥⑦	⑤⑥⑦	⑤⑥⑦	④⑤⑥⑦	⑤⑥⑦	⑥⑦	⑤⑥⑦

① Includes primary winding, Motorola Part No. 24C736623, secondary winding, Motorola Part No. 24C736095, and core, Motorola Part No. 46K735112.
② Does not include yoke retainer wedge, Motorola Part No. 42A736257, nor yoke wedge clamp, Motorola Part No. 42A736175.
③ Alternate Motorola Part Number.
④ Use original rear cover and centering device, Motorola Part No. 48A721145.
⑤ Use original core clamp.
⑥ Jumper yoke terminals #3 and #6.
⑦ Use original horizontal damping network.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T5	2.7KΩ	3.5Ω	25K736256-D	Z1001 ①	A3018	A3849	22S46 ①	S-53X	① Drill one new mtg. hole.

SPEAKER

ITEM No.	RATINGS: SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA: MOTOROLA PART No.	QUAM PART No.	RCA TYPE No.	NOTES
SP1	5 1/4"	85Ω	3.5Ω	50K737291 ①	52E85S ①		① Used in Models 21T25CH, PK, TN, Y21T25CH, PK, TN.
	8"	85Ω	3.5Ω	50C737673 ②	8E85S ②		② Used in Models 21K38, B, Y21K38, B.

COILS (RF-IF)

ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	REPLACEMENT DATA: MOTOROLA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Matching Coil	.1Ω		24B737257				Tapped
L2	IF Trap	0Ω		24A737259				
L3A	Ant. Coils	0Ω		24K737262				Channels 2 thru 6
B	Ant. Coils	0Ω						Channels 7 thru 12
L4	Ant. Shunt Coil	0Ω		24A737260				Channels 2 thru 4
L5	Ant. Shunt Coil	0Ω		24K735659				Channels 4 thru 6
L6	Ant. Coil	0Ω		24A735660				Channel 13
L7	Fil. Choke	0Ω		24K730391				
L8	Neut Coil	0Ω		24B721256				
L9	RF Coil	0Ω		24A735656				Channel 13
L10A	RF Coils	0Ω		24B736441				Channels 7 thru 12
B	RF Coils	0Ω						Channels 2 thru 6
L11	Fil. Choke	0Ω		24K730391				
L12	Osc. Coil	0Ω		24A737258				Channel 13
L13A	Osc. Coils	0Ω		24C737261				Channels 2 thru 6
B	Osc. Coils	0Ω						Channels 7 thru 12
L14	Conv. Plate	.2Ω	.1Ω	1V735453				
L15	1st Video IF	.1Ω	.2Ω	24K736270	17-4522	TV-130	6219	Core Part #76A735943
L16	Fil. Choke	0Ω		24K730391	19-1001	TV-189	4604	1.3 Microhenries
L17	41.25MC Trap	.1Ω		24B736966	20-1049	TV-131	6225	Core Part #76A735943
L18	2nd Video IF	.2Ω	.2Ω	24B736267	17-4522	TV-130	6219	Core Part #76A735943
L19	Fil. Choke	0Ω		24K730391	19-1001	TV-189	4604	1.3 Microhenries
L20	3rd Video IF	.2Ω	.2Ω	24B736268	17-4523	TV-130	6219	Core Part N#76A735943
L21	Fil. Choke	0Ω		24K730391	19-1001	TV-189	4604	1.3 Microhenries
L22	RF Coil	0Ω		24A732652	19-1002		4606	2 Microhenries
L23	Series Peaking Coil	1.8Ω		24K737733	19-1005		4612	10 Microhenries
L24	Series Peaking Coil	5.3Ω		24K736961	19-3125 *		6153 *	115 Microhenries, Wound on 6.8KΩ resistor
L25	Shunt Peaking Coil	11Ω		24K736963	19-4400		6136	440 Microhenries
L26	4.5MC Trap	5.5Ω		24K737615	20-1004	TV-151	1469	Core Part #76B733245
L27	Series Peaking Coil	7.8Ω		24K736012	19-3250 ■	TV-185 ■	6181 ■	246 Microhenries, Wound on 10KΩ resistor
L28	Shunt Peaking Coil	14.5Ω		24K737213	19-3660 ▲		6148 ▲	675 Microhenries, Wound on 1.8KΩ resistor
L29	Shunt Peaking Coil	18Ω		24K736496	19-4950 ▲		4652 ▲	1020 Microhenries, Wound on 1.8KΩ resistor
L30	RF Coil	1.8Ω		24K737733	19-1005		4612	10 Microhenries
L31	Sound IF	13Ω		24B736226				Core Part #76B733245
L32	RF Choke	10Ω		24K736007	19-4400		6134	375 Microhenries
L33	Fil. Choke	0Ω		24K730391	19-1001	TV-189	4604	1.3 Microhenries
L34	Ratio Det.	8.2Ω	1.6ΩCT	24K735697	17-3497	TV-115	6205	Tertiary Winding=1Ω-Note 1
L35	RF Choke	1.7Ω		24K733225	19-1005		4612	
L36	RF Choke	1.7Ω		24K733225	19-1005		4612	

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	MOTOROLA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L37	Linearity Coil	20Ω		24K731609				Wound on .068MFD Cap.
L38	RF Coil	8.8Ω		24R119889	19-3300	TV-190	6132	340 Microhenries
L39	Horiz. Osc.	39Ω		1V737757	19-1576	TV-163	6210	Core Part #46A780344

Note 1. Alternate Part #24B736673.
* Parallel with 6.8KΩ resistor.
■ Parallel with 10KΩ resistor.
▲ Parallel with 1.8KΩ resistor.

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	MOTOROLA PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.220ADC	48K122454	1236A	MR300	68300	6Q4	300	
M2	.220ADC	48K122454	1236A	MR300	68300	6Q4	300	

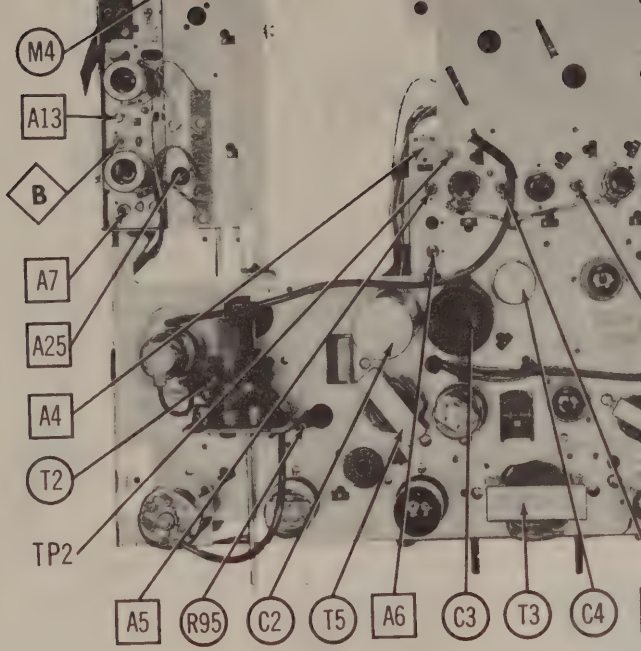
CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA		NOTES
		MOTOROLA PART No.	SYLVANIA PART No.	
M3		48K733204 *	1N60	Video Det. (Pigtail)

* Alternate Part No. 48K722720.

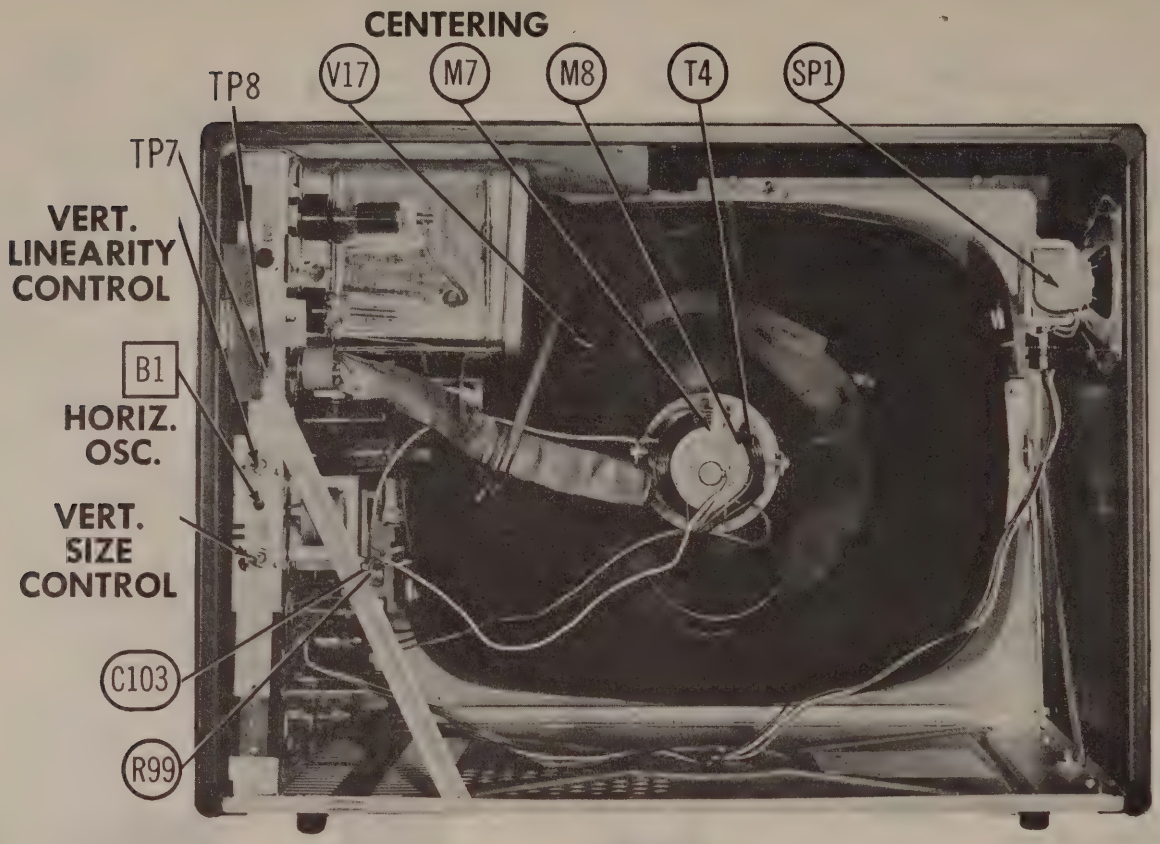
MISCELLANEOUS

ITEM No.	PART NAME	PART No.	NOTES
M4	Tuner	1U736222	VHF-TT77-Chassis TS-530
	Tuner	1U736217	VHF-TT78-Chassis TS-530Y
M5	Tuner	QTT-37	UHF-Chassis TS-530Y
M6	Video Det. Assy.	24C736478	Includes M3, Coils, & Capacitors
M7	Centering Device	48A721145	Includes Deflection Yoke (T4) Rear Cover
M8	Ion Trap	59K734028	
A4	Trimmer Cap.	20A736287	Video IF Input Trimmer (20-140MMF)
	Cabinet	16E736684	Models 21K38, Y21K38
	Cabinet	16K736685	Models 21K38B, Y21K38B
	Cabinet	16K737454	Models 21T25CH, Y21T25CH
	Cabinet	16K737452	Models 21T25PK, Y21T25PK
	Cabinet	16K737453	Models 21T25TN, Y21T25TN
	Knob	36B736235	Contrast- All Models
	Knob	36K736677	Fine Tuning-Models 21K38, B; Y21K38, B; 21T25TN, Y21T25TN
	Knob	36A736676	Fine Tuning-Models 21T25CH, Y21T25CH
	Knob	36K736677	Fine Tuning-Models 21T25TN, Y21T25TN
	Knob	36B736985	Horiz. Hold, Vert. Hold & Brightness-Models 21K38, B; Y21K38, B; 21T25TN, Y21T25TN
	Knob	36K736986	Horiz. Hold, BVert. Hold & Brightness-Models 21T25CH, Y21T25CH
	Knob	36K737376	Horiz. Hold, Vert. Hold & Brightness-Models 21T25PK, Y21T25PK
	Knob	36B736987	On-Off-Volume-Models 21K38, B; Y21K38, B; 21T25TN, Y21T25TN
	Knob	36K736988	On-Off-Volume-Models 21T25CH, Y21T25CH
	Knob	36K737375	On-Off-Volume-Models 21T25TN, Y21T25TN
	Knob	36K736246	VHF Channel Selector-Models 21K38, B; 21T25TN
	Knob	36K736245	VHF Channel Selector-Models Y21K38, B; Y21T25TN
	Knob	36K736248	VHF Channel Selector-Model 21T25CH
	Knob	36K736247	VHF Channel Selector-Model Y21T25CH
	Knob	36K736244	VHF Channel Selector-Model 21T25PK
	Knob	36K736243	VHF Channel Selector-Model Y21T25PK
	Scale	34C736236	UHF Dial-Models Y21K38, B; Y21T25CH, PK, TN
	Safety Glass	61C736858	Models 21K38, B; Y21K28, B,
	Safety Glass	61C736857	Models 21T25CH, PK, TN; Y21T25CH, PK, TN



CHASSIS TOP VIEW

TP1	0V	IF AGC	TP6	0V
TP2	135V	B+V3 SCREEN	TP7	205V
TP3	-.6V	VIDEO	TP8	-.5V
TP4	135V	LOW B+ LINE	TP9	47VAC
TP5	235V	HIGH B+ LINE	TP10	22VAC



CABINET—REAR VIEW

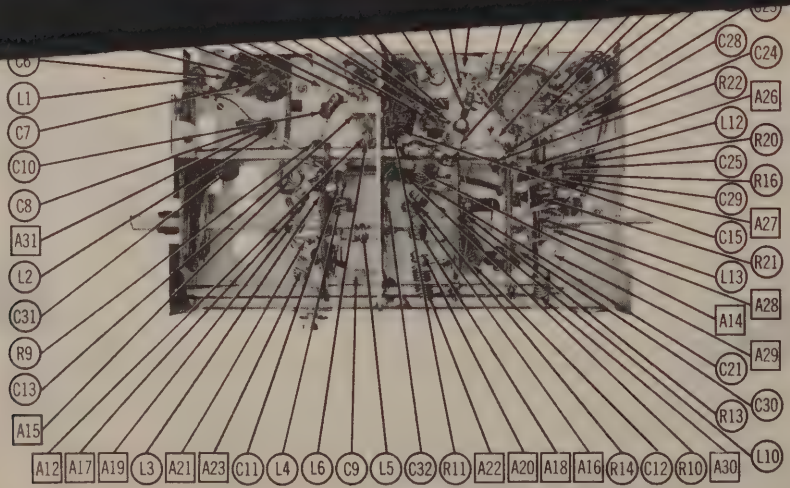
HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably one transmitting a test pattern. Adjust the brightness and contrast controls for a normal picture.

1. Short out the AFC voltage and shunt the horizontal oscillator coil (L39) to ground (chassis) with a .1MFD/400V capacitor. This may be done with the chassis in the cabinet by using the three pin sockets on the rear of chassis labled "Test Receptacle".

3. Remove the .1MFD capacitor from L39 and adjust the horizontal oscillator slug (B1) to the point where the picture remains stable horizontally.

4. Remove short from AFC voltage and adjust the horizontal hold control until picture remains in sync over appro[illegible] its range while [illegible]



RF TUNER BOTTOM VIEW

TRADE NAME	Olympic Model 403
MANUFACTURER	Olympic Radio & Tel. Corp., 34-01 38th Ave., Long Island City 1, N. Y.
TYPE SET	AC Operated AM Superheterodyne Receiver With 3 Speed Automatic Record Changer
TUBES (Five)	Types 12BE6 Converter, 12BA6 IF Amp., 12AV6 Det.-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	105-120 Volts AC - 60 Cycles
RATING	.22 Amp. @117 Volts AC
TUNING RANGE—BROADCAST	540KC -1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to antenna Lug on tuning gang. Low side to chassis.	455KC (400∿ mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.		Loop (Radiated)	1620KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1500KC	Tune to 1500KC signal	"	A6	"

FOR SERVICE INFORMATION ON RECORD CHANGER UNIT RX-4083 - SEE SIMILAR CRESCENT 500 SERIES - PHOTOFACT SET #197 - FOLDER #4 OR RECORD CHANGER MANUAL CM-5.

L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

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TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	REPLACEMENT DATA		NOTES
		OLYMPIC PART No.	STANDARD REPLACEMENT	
V1	Converter	12BE6	12BE6	
V2	IF Amplifier	12BA6	12BA6	
V3	Det. -AVC-AF Amp.	12AV6	12AV6	
V4	Output	50C5	50C5	
V5	Rectifier	35W4	35W4	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	OLYMPIC PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	40	150	CO3533	PRS150V4040	BBRD4415	TCD48	TDL-D40-150	FMD-1540	TVA-2445
B	40	150							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	OLYMPIC PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	12		CCDY-120K							
C3	02	400	CO-H-4203	BPD-02	DD-203	CUB4S2	817-02	PT412	4TM-S2	
C4	.1	400	CO-H-4104	P488N-1	DF-104	CUB4P1		PT401	4TM-P1	
C5A	220									
B	2000									
C	5000		♦PC-2477	♦PA-113-1	♦PC-150	♦116TM1	♦1408-01		♦DT-1	
D	250									
E										
C6	5000		CCD-502X	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C7	047	400	CO-B-4473	BPD-05	DF-503	CUB4S47		PT4147	4TM-S47	
C8	.1	400	CO-H-4104	P488N-1	DF-104	CUB4P1		PT401	4TM-P1	

♦Items C5A, C5B, C5C, C5D, C5E, R7A, R7B, and R7C are combined in one unit. When replacing items separately, C5D and C5E should total 250MMF.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	OLYMPIC PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	1Meg	½	PT3731	AB-70	A47-1Meg-Z	Q13-137	U-53	Volume
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	KB-1	SWE-12	76-1	US-26	Attach to R1A

RESISTORS

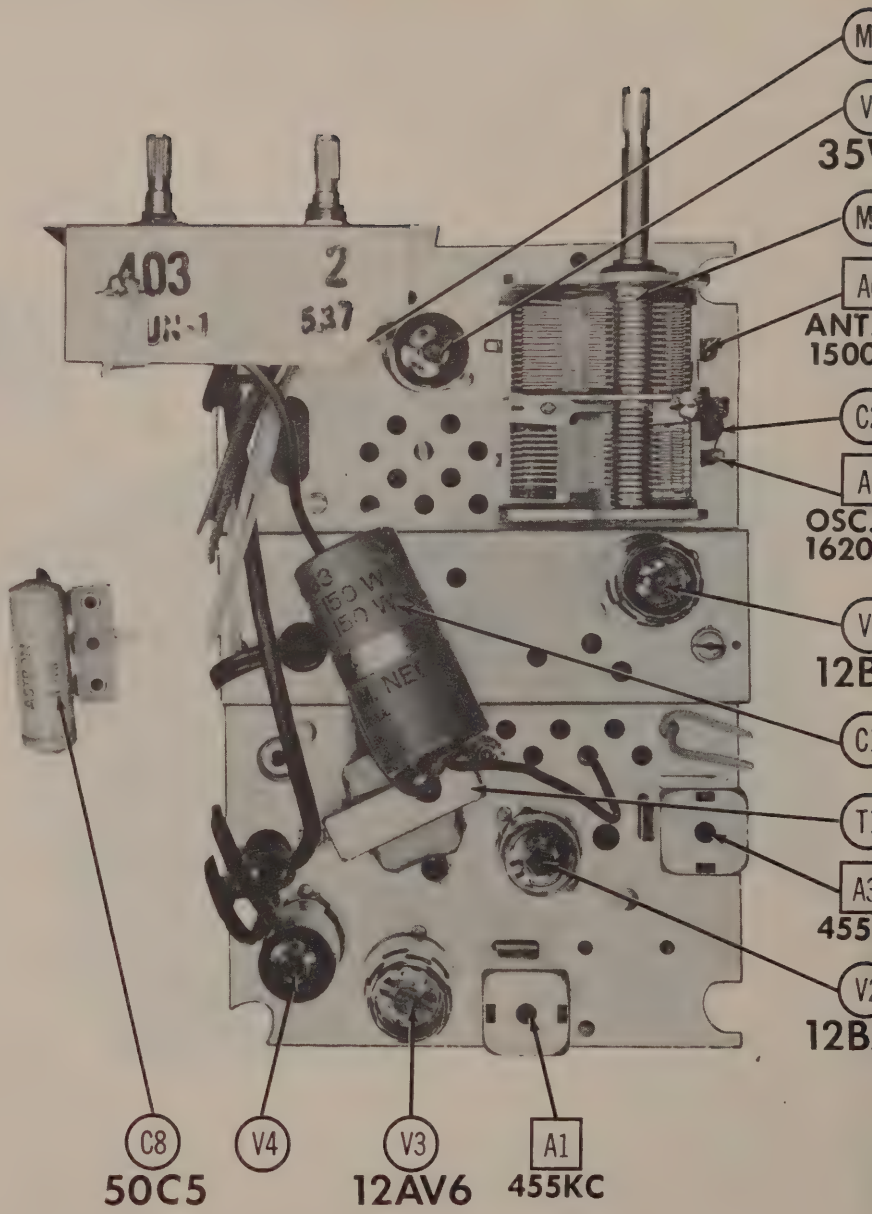
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	OLYMPIC PART No.	IRC PART No.	
R2	22KΩ	½	REB-223M	BTS-22K	
R3	100KΩ 5%	½	REB-104K	BTS-100K	
R4	68Ω	½	REB-680M	BTS-68	
R5	2. 2Meg	½	REB-225M	BTS-2. 2Meg	
R6	1Meg	½	REB-105M	BTS-1Meg	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	OLYMPIC PART No.	IRC PART No.	
R7A	6. 8Meg		♦PC-2477	BTS-6. 8Meg	
B	470KΩ			BTS-470K	
C	470KΩ			BTS-470K	
R8	1000Ω	1	REC-102M	BTA-1000	
R9	150Ω	½	REB-151M	BTS-150	

♦Items R7A, R7B, R7C, C5A, C5B, C5C, C5D, C5E are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	OLYMPIC PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	3. 2KΩ	3-4Ω	TR-3542	Z1102	A3031 ①	A3336	24S50	S-16X	①Drill one new mounting hole



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	OLYMPIC PART No.	QUAM PART No.	RCA TYPE No.	
SP1	4"	PM	3-4Ω	SK-3541	4A06	223S1	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	OLYMPIC PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	2.9Ω		LP-3777				Includes Cabinet Back
L2	Osc. Coil	1.1Ω	5.3Ω	CL-3532	14-1073*		69-0SC	
L3	Input IF	15Ω	15Ω	TR-1644	16-6758	BC-352	12-C1	
L4	Output IF	15Ω	15Ω	TR-1644	16-6758	BC-353	12-C2	
L5	Chassis Isolation	0Ω						14½ turns #22 insulated wire wound on .1MFD Cap.

*Leads sufficient mtg. support

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA					REMARKS
	OLYMPIC PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M1		66-2	K-AG			

ASTATIC NEEDLE LISTING SHOWN ABOVE IS SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGES LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENTS SEE BELOW.

PHONO NEEDLE

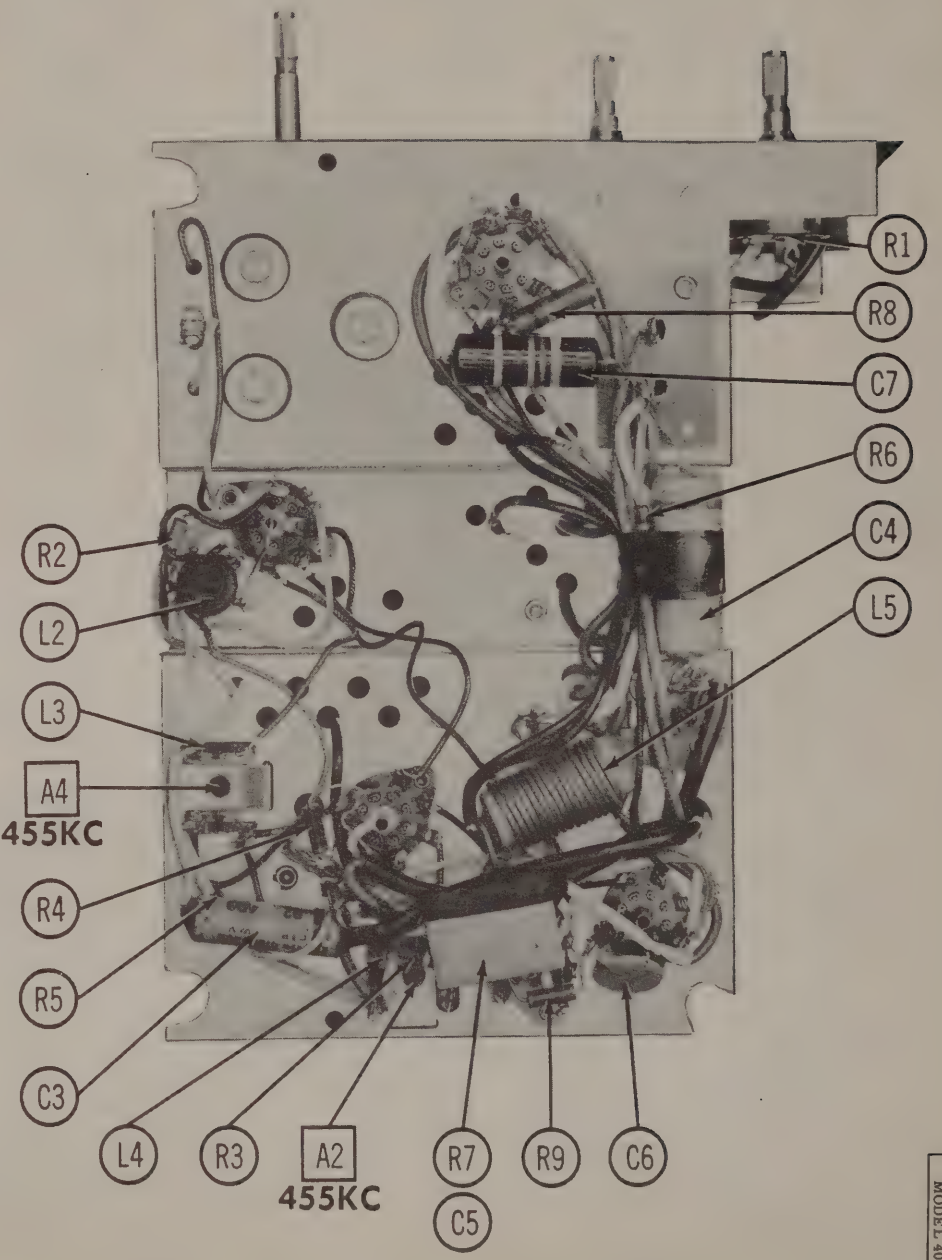
(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

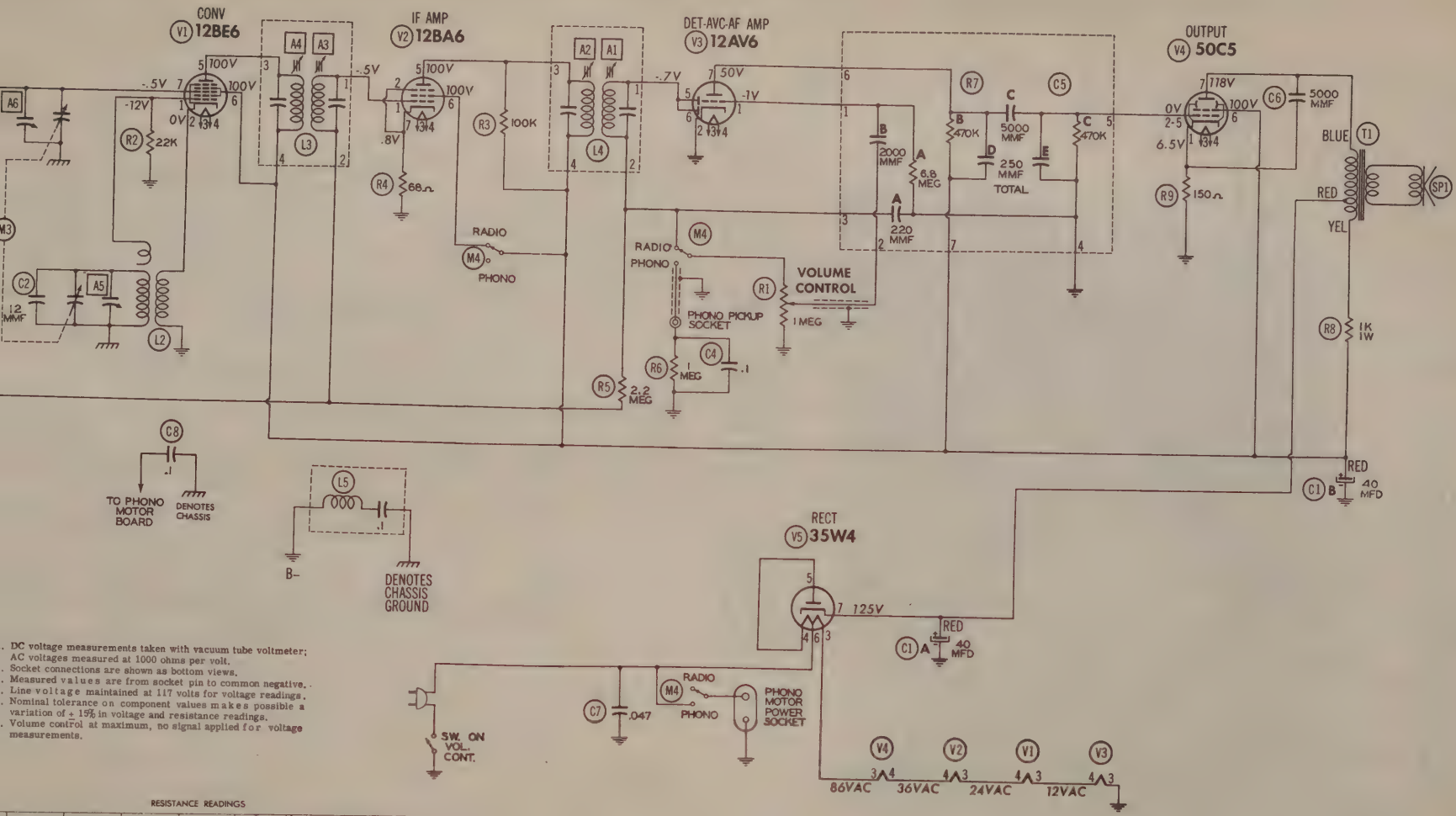
ITEM No.	REPLACEMENT DATA				REMARKS
	OLYMPIC PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	
M2		*A-762 or † A-672 or ♦A-672D		*W-39AGA	* Metal † Jewel ♦ Diamond

MISCELLANEOUS

ITEM No.	PART NAME	OLYMPIC PART No.	NOTES
M3	Tuning Cap.	CV-3730	2 Gang (19 - 425MMF, 19 - 180MMF.)
M4	Switch	SW-4221	Radio - Phono (3 pole - 2 position; rotary, wafer type)
	Cabinet	CA-4124	Mahogany
	Cabinet	CA-4124-1	Blonde
	Knob	KN-3491-IT	Tuning - Tan
	Knob	KN-3491-IW	Tuning - Walnut
	Knob	KN-3740	On-Off - Volume - Walnut
	Knob	KN-3742	On-Off - Volume - Tan
	Knob	KN-3741	Radio - Phono - Walnut
	Knob	KN-3743	Radio - Phono - Tan

CHASSIS—BOTTOM VIEW





1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

RESISTANCE READINGS

	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
	22KΩ	1Ω	12Ω	24Ω	† 1KΩ	† 1KΩ	3. 2Meg
	3. 2Meg	68Ω	24Ω	36Ω	† 1KΩ	† 1KΩ	68Ω
	6. 8Meg	0Ω	0Ω	12Ω	1Meg	1Meg	† 471KΩ
	150Ω	470KΩ	86Ω	36Ω	470KΩ	† 1KΩ	† 200Ω
	TP	TP	86Ω	121Ω	121Ω	115Ω	100KΩ

ALL MEASUREMENTS TAKEN IN RADIO POSITION.
† MEASURED FROM PIN 7 OF V5.
TP - TIE POINT

STANDARD NOTATION SCHEMATIC

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IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

PHOTOFACT* Folder

*TRADE MARK

RETMA MEMBER

RCA VICTOR MODELS 17-PT-6962, U, 17-S-6022, U, 17-S-6025, U, 17-S-6027, U (Ch. KCS94, A)

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RCA VICTOR 17-S-6022

TRADE NAME	RCA Victor	MODELS	CHASSIS	TUNER
		17-S-6022, 17-S-6025, 17-S-6027, 17-PT-6962	KCS94	KRK32B
		17-S-6022U, 17-S-6025U, 17-S-6027U, 17-PT-6962U	KCS94A	KRK29K and KRK36A
MANUFACTURER	Radio Corporation of America , RCA Victor Television Division, Camden 2, N.J.			
TYPE SET	Television Receiver			
TUBES	Sixteen			
POWER SUPPLY	110-120 Volts AC-60 Cycle	RATING 1.32 Amp. @ 117 Volts AC		
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)			

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RCA VICTOR MODELS 17-PT-6962, U, 17-S-6022, U, 17-S-6025, U, 17-S-6027, U (Ch. KCS94, A)

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DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 7 push-on type control knobs from top panel of cabinet. (Also remove 2 metal screws holding plastic guard.)

2. Remove 5 clip springs from rear cover. Remove rear cover.

3. Remove picture tube socket, ion trap and centering magnet.

4. Disconnect speaker leads.

5. Remove 2 chassis bolts from bottom of cabinet and 2 hex nuts at the top holding chassis in cabinet.

6. Pull chassis part way out and remove HV lead, then remove chassis the rest of the way.

RCA VICTOR MODELS 17-PT-6962, U, 17-S-6022, U, 17-S-6025, U, 17-S-6027, U (Ch. KCS94, A)

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removing the channel selector and fine tuning knobs.

PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove clamp under the bottom edge of the front metal trim and let safety glass slide down and out bottom of cabinet). Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 11.

SPECIAL ADJUSTMENTS

AGC Control Adjustment (Used in VHF-UHF Models only)

If receiver overloads on a strong signal, adjust the AGC control until picture shows no sign of overloading or unstable sync.

The normal setting of the AGC control is at its mid-range position.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

The horizontal hold control (L54) is located on the control panel of the chassis and is used as a horizontal hold control. If horizontal sync cannot be brought in by adjusting the horizontal hold, set it at approximately its mid-range position, and synchronize the picture by adjusting the horizontal waveform slug (B1).

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (A49) located on top of chassis.

FUSES

One fuse is used for horizontal sweep circuit protection. (For location see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

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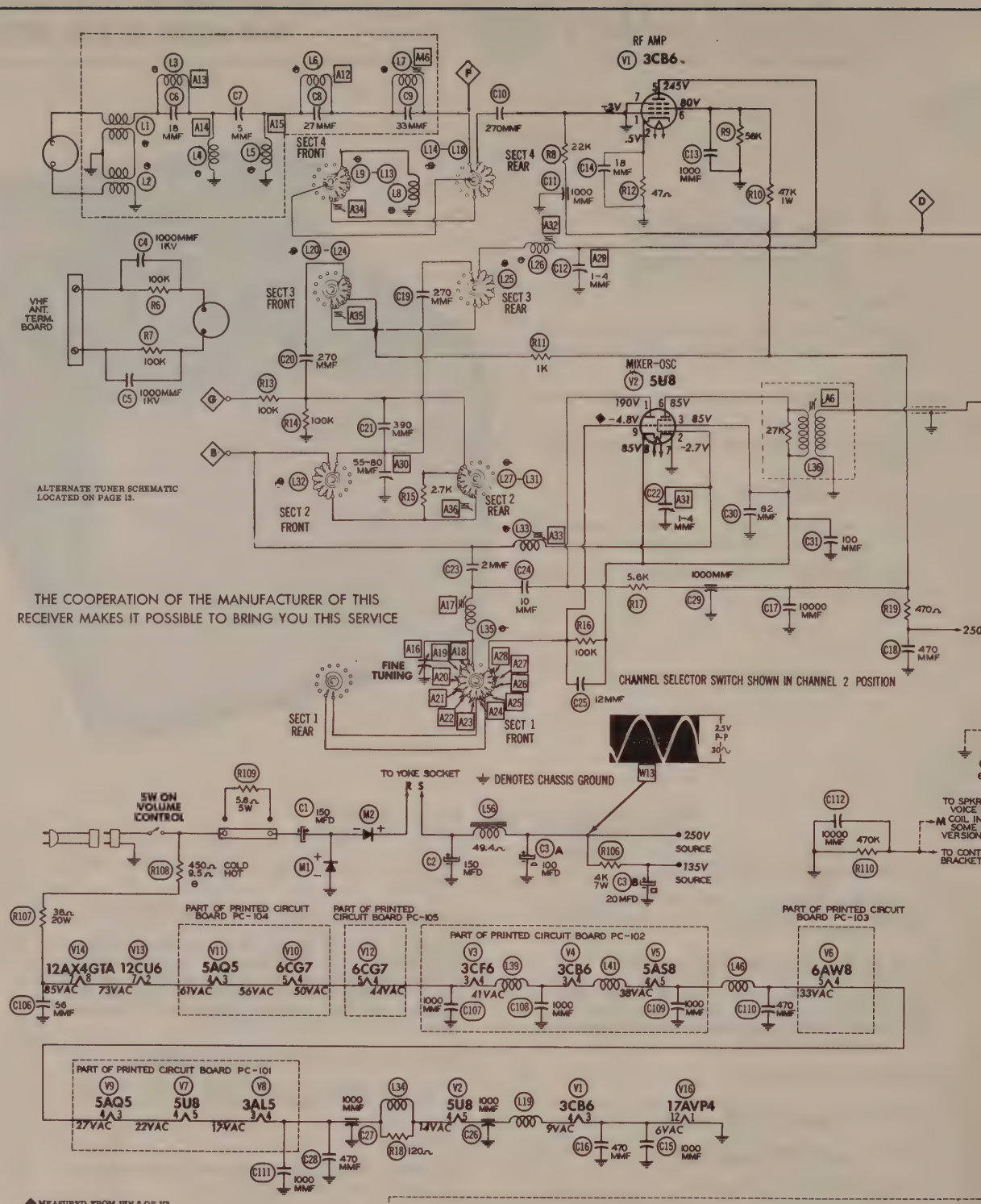

◆ MEASURED FROM PIN 8 OF V2.

■ MEASURED FROM PIN 7 OF V4.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM. (SEE PARTS LIST)

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE

FILAMENT CONNECTIONS USED IN UHF-VHF MODELS

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltage measured at 1,000 ohms per volt.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation; no signal applied.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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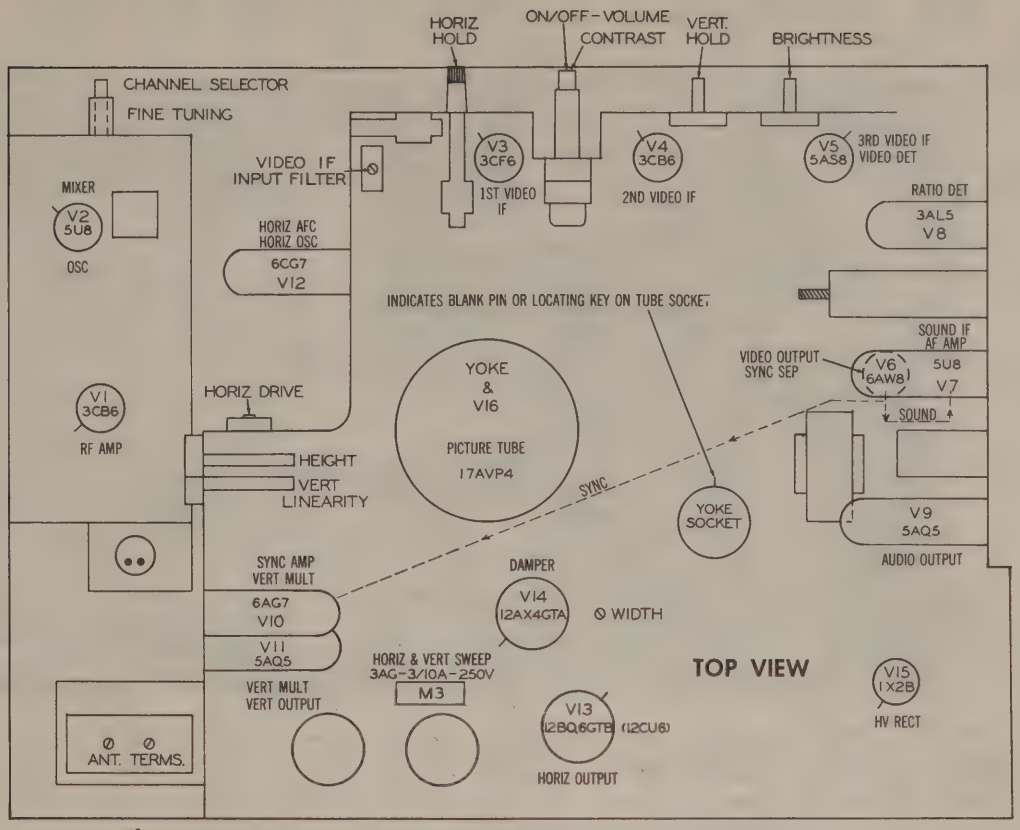
TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

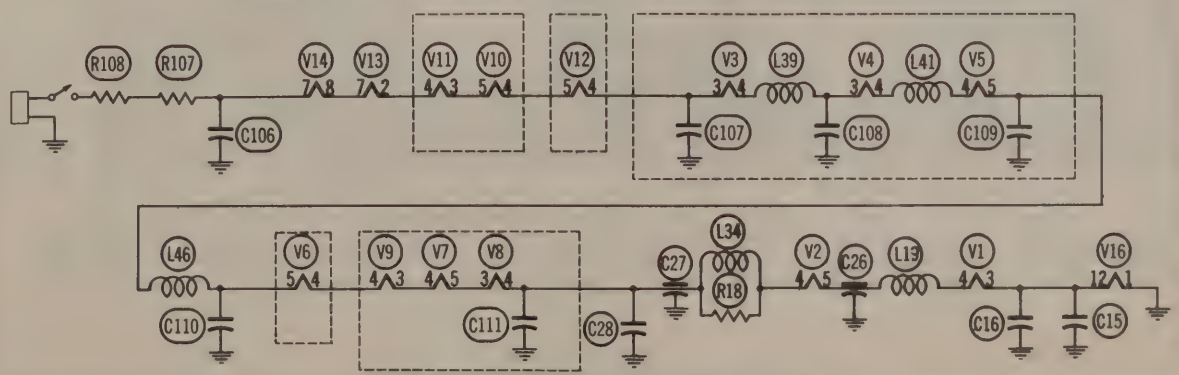
POWER SUPPLY FAILURE
No raster, no sound -Selenium Rectifiers (M1 & M2)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V6, V16
Has pic, no sound - V7, V8, V9

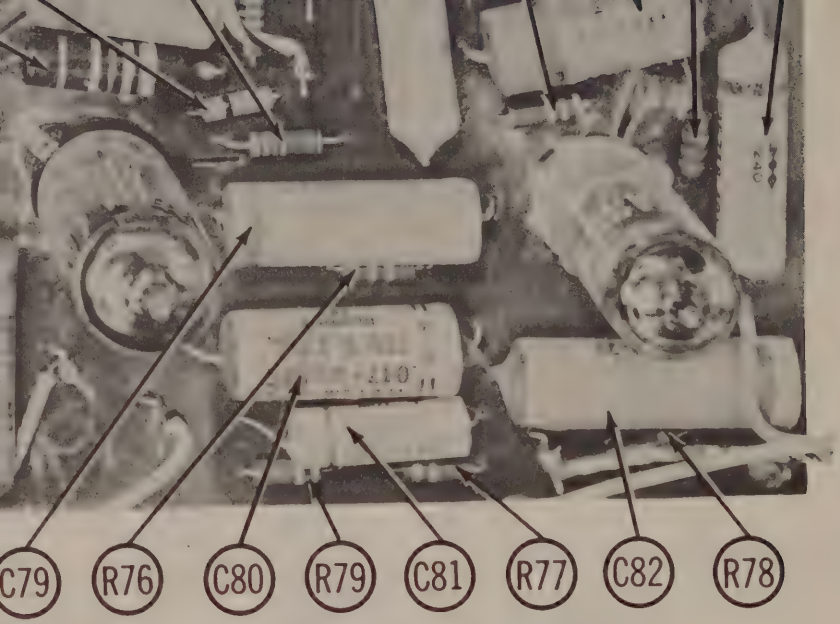
SYNC FAILURE
No vert. sync - V10, V11
No horiz. sync - V10, V12
No vert. or horiz. sync - V6, V10

SWEEP FAILURE
No raster, has sound - V12, V13, V14, V15, V16, Fuse (M1)
No vertical deflection - V10, V11
Poor vert. linearity or foldover - V10, V11
Poor horiz. linearity or foldover - V12, V13, V14
Narrow picture - V12, V13, V14, V15, M1, M2
Vert. off freq. - V10, V11
Horiz. off freq. - V10, V12

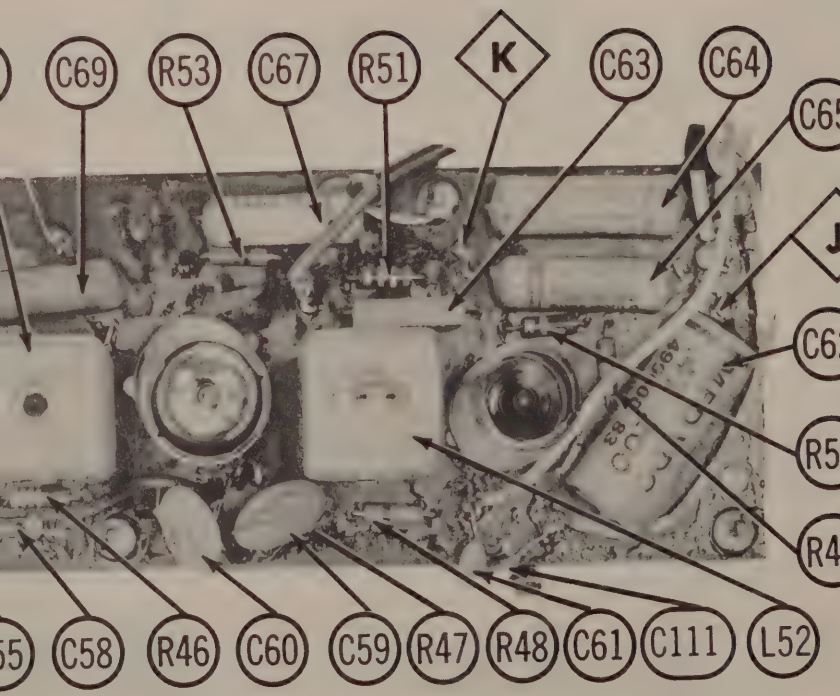
NOTE: Since this receiver employs tubes used in a series-parallel filament network, an open filament in any tube in series may cause the set to be inoperative. (See circuit below).



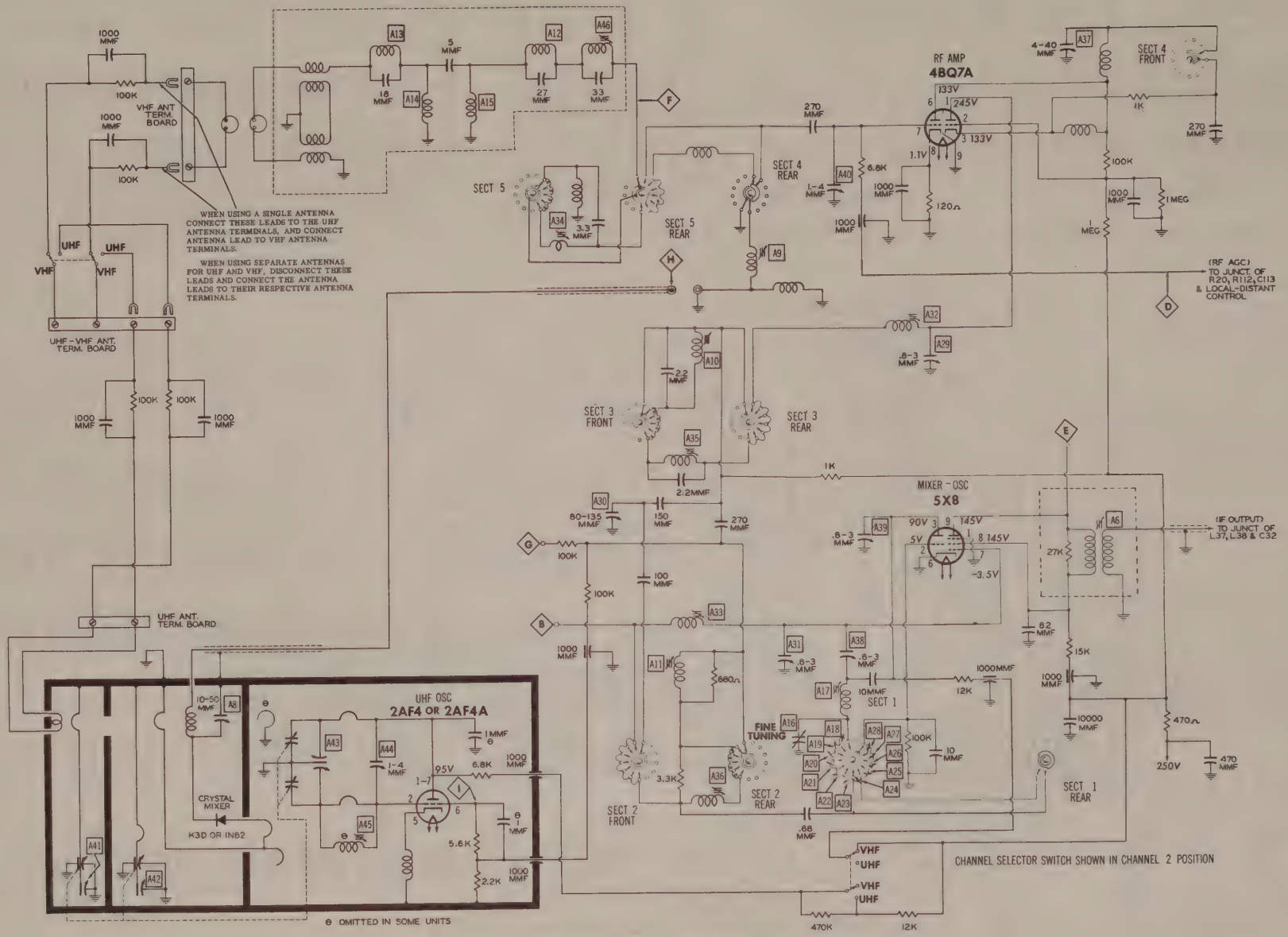
RCA VICTOR MODELS 17-PT-6962, U, 17-S-6022, U, 17-S-6025, U, 17-S-6027, U (Ch. KCS94, A)



TICAL & SYNC UNIT SUB-CHASSIS



SOUND IF SUB-CHASSIS


RF AMP
4BQ7A
MIXER - OSC
5X8
UHF OSC
2AF4 OR 2AF4A
CRYSTAL MIXER
K3D OR IN82
FINE TUNING
SECT 1
SECT 1 REAR
SECT 2 FRONT
SECT 2 REAR
SECT 3 FRONT
SECT 3 REAR
SECT 4 FRONT
SECT 4 REAR
SECT 5
SECT 5 REAR
VHF ANT. TERM. BOARD
UHF - VHF ANT. TERM. BOARD
UHF ANT. TERM. BOARD
WHEN USING A SINGLE ANTENNA CONNECT THESE LEADS TO THE UHF ANTENNA TERMINALS, AND CONNECT ANTENNA LEAD TO VHF ANTENNA TERMINALS.
WHEN USING SEPARATE ANTENNAS FOR UHF AND VHF, DISCONNECT THESE LEADS AND CONNECT THE ANTENNA LEADS TO THEIR RESPECTIVE ANTENNA TERMINALS.
(RF AGC) TO JUNCT. OF R20, R112, C113 & LOCAL-DISTANT CONTROL
(IF OUTPUT) TO JUNCT. OF L37, L38 & C32
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 2 POSITION
θ OMITTED IN SOME UNITS

UHF TUNER KRK 36A, AND VHF TUNER KRK 29K USED WITH CHASSIS KCS 94A

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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UHF-VHF TUNER SCHEMATIC

17-5-6025, U, 17-5-6027, U (Ch. KCS94, A)

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	REPLACEMENT DATA: RCA Victor PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	NOTES
V1	RF Amplifier	3CB6	3CB6	
V2	Mixer-Oscillator	5U8	5U8	
V3	1st. Video IF Amplifier	3CF6	3CF6	
V4	2nd. Video IF Amplifier	3CB6	3CB6	
V5	3rd. Video IF Amplifier-Video Detector	5AS8	5AS8	
V6	Video Output-Sync Separator	6AW8	6AW8	
V7	Sound IF Amplifier-AF Amplifier	5U8	5U8	
V8	Ratio Detector	3AL5	3AL5	
V9	Audio Output	5AQ5	5AQ5	
V10	Sync Amplifier-Vert. Mult.	6CG7	6CG7	
V11	Vert. Mult.-Vert. Output	5AQ5	5AQ5	
V12	Horiz. AFC-Horiz. Osc.	6CG7	6CG7	
V13	Horiz. Output	12BQ6GTB/12CU6	12BQ6GTB/12CU6	
V14	Damper	12AX4GTA	12AX4GTA	
V15	HV Rectifier	1X2B	1X2B	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: RCA Victor PART No.	REPLACEMENT DATA: CBS PART No.	REPLACEMENT DATA: GENERAL ELECTRIC PART No.	REPLACEMENT DATA: SYLVANIA PART No.	NOTES
V16	17AVP4	17AVP4 17AVP4A ①		17AVP4 17AVP4A②	① Aluminized ② Silver screen "85"

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: RCA Victor PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	150	200		AFHS1-37-25	XA007		TD-150-300	S-160	R2165
C2	150	350		E4A315	B033	FP227.6	TM-150-450	D-177	TVL-2635
C3A	▲100	350	100044	AFH4-56-60	C152	FP389.1	TM-4122	Q-410	TVL-4632
B	■20	350			BR2035	TC36		MTD-3520	TVA-1604
C	▲10	350							
D	20	50							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: RCA Victor PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C4	1000	1000	100124	HVD-15-1000	DD-102	VD1	1R5KV-102	DC3021	10GA-D1	
C5	1000	1000	100124	HVD-15-1000	DD-102	VD1	1R5KV-102	DC3021	10GA-D1	
C6	18				TCZ-18	Z022	NP0K-180			
C7	5			NP0-DI5	TCZ-5	Z011	NP0A-050	ZT-555	5TCCB-V47	
C8	27				TCZ-27	Z027	NP0L-270			
C9	33			NP0-SI33	TCZ-33	TZ18	NP0L-330	ZT-5433	5TCC-Q33	
C10	270		77838	SI270	D6-271	TP41	GP2K-271	UC-5327	5GA-T27	
C11	1000		77084	EF-001	MFT-1000				503C-D1	
C12	1-4		76532		829-4		3115-01-10	CT551		
C13	1000		77252	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C14	18		54207	NP0-SI20	TCZ-18	TZ12	NP0K-180		5TCC-Q2	
C15	1000		77252	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C16	470		77293	BPD-00047	DD-471	K060	831-471	UC-5347	5GA-T47	
C17	10000		73960	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C18	470		77293	BPD-00047	DD-471	K069	831-471	UC-5347	5GA-T47	
C19	270		77838	SI270	D6-271	TP41	GP2K-271	UC-5327	5GA-T27	
C20	270		77838	SI270	D6-271	TP41	GP2K-271	UC-5327	5GA-T27	
C21	390		75641	SI390	D6-391	TP44	GP2K-391	UC-5339	5GA-T39	
C22	1-4		76532		829-4		3115-01-10	CT551		
C23	2									
C24	10		77865	NP0-SI10	TCZ-10	TZ09	NP0A-100	ZT-541	5TCC-Q1	
C25	12		79710	SI12	D6-120	G019	GP1K-120	UC-5412	5GA-Q12	
C26	1000		77084	EF-001	MFT-1000				503C-D1	
C27	1000		77084	EF-001	MFT-1000				503C-D1	
C28	470		77293	BPD-00047	DD-471	K060	831-471	UC-5347	5GA-T47	
C29	1000		77084	EF-001	MFT-1000				503C-D1	
C30	82		78603	SI82	D6-820	G040	801-820		5GA-Q82	
C31	100		79735	BPD-0001	DD-101	G042	811-101	UC-531	5GA-T1	
C32	39									Note .
C33	15		39044	N750-SI15	TCN-15	TN03	N750K-150		5TCU-Q15	
C34	1000		77252	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C35	470		78622	BPD-00047	DD-471	K060	831-471	UC-5347	5GA-T47	
C36	.39	200	79318							
C37	470		77293	BPD-00047	DD-471	K060	831-471	UC-5347	5GA-T47	
C38	1000		78623	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C39	1000		77252	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C40	1000		77252	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C41	1000		78623	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C42	220		100672	BPD-00022	DD-221	G051	811-221	UC-5322	5GA-T22	
C43	4700		73473	BPD-0047	DD-472	K079	811-0047	DC-525	5HK-D47	
C44	3		101200	NP0-SI3	TCZ-3R3	TZ06	NP0A-030	ZT-553	5TCCB-V33	
C45	1000		78623	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C46	8		78228							
C47	10000		73960	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C48	.47	200	73787	P288N-47		CUB2P47		PT4047	2TM-P47	
C49	.1	200	73784	P288N-1	DF-104	CUB2P1		PT401	2TM-P1	
C50	1000	500	53300	BPD-001	DD-102	1W5D1	GP2L-102	MC255	1FM-21	
C51	.47	200	100299	P288N-47		CUB2P47		PT4047	2TM-P47	
C52	27		100352		TCZ-27	TZ16	NP0L-270			
C53	.22	600	100346	P688N-25		CUB6P25		PT6022	6TM-P25	
C54	.047	200	73558	P288N-047	DF-503	CUB2S47		PT4147	2TM-S47	
C55	.22	400	73562	P488N-22		CUB4P22		PT4022	4TM-P22	
C56	3		76507	NP0-SI3	TCZ-3R3	TZ06	NP0A-030	ZT-553	5TCCB-V33	
C57	39		100350							
C58	56		79324	N750-SI56	TCN-56	TN16	N750K-560		5TCU-Q56	
C59	10000		73960	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C60	10000		73960	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C61	1000		77252	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C62	.47	200	79148	P288N-47		CUB2P47		PT4047	2TM-P47	
C63	1000	500	39652	SI1000	D6-102	1W5D1	GP2L-102	MC255	1FM-21	
C64	.0027	600		SI2700	D6-272	TP59	GP2-333-272	UC-5227	5GA-D27	
C65	.0082	400								
C66	.01	200	79316	BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C67	.01	200	79014	BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C68	.0027	600	73599	SI2700	D6-272	TP59	GP2-333-272	UC-5227	5GA-D27	
C69	.01	400		BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C70	.0033	1000		HVD-15-3300	DD-302	CUB16D33	1R5KV-332	PT16233	MB-D33	

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: RCA Victor PART No.	AEROVOX PART No.	C
C71	4700		73473	BPD-0047	
C72	.1	400	77423	P488N-1	
C73	330	500	39640	SI330	
C74	330	500	39640	SI330	
C75	.033	400	73552	BPD-03	
C76	.01	400	73561	BPD-01	
C77	.0022	600	73595	SI2200	
C78	.0047	600	73920	1464-0047	
C79	.022	600	73798	BPD-02	
C80	.047	400	73553	BPD-05	
C81	.01	400	73561		
C82	.068	400	79016		
C83	.0039	400	79018	1464-0039	
C84	.015	200	79530		
C85	.027	600	100303		
C86	.001	1600	73849	HVD-30-1000	
C87	220	500	39636	SI220	
C88	82	1000	76474		
C89	68	1000	76475	HVD-15-68	
C90	.1	400	73551	P488N-1	
C91	.022	400	79932	BPD-02	
C92	.47	200	100299	P288N-47	
C93	330	1000	76476		
C94	.01	600	73594		
C95	.0012	600	76995	1464-0012	
C96	470	1000		HVD-15-470	
C97	.1	600	73557	P688N-1	
C98	.27	200	73786		
C99	270	1000	79022	HVD-15-270	
C100	.047	1000	73597	P1088N-047	
C101	.1	400	73551	P488N-1	
C102	.1	400	73551	P488N-1	
C103	150	2500	100453	HVD-30-150	
C104	150	2500	100453	HVD-30-150	
C105	150			HVD-30-150	
C106	56		71924	SI56	
C107	1000		77252	BPD-001	
C108	1000		77252	BPD-001	
C109	1000		77252	BPD-001	
C110	470		77293	BPD-00047	
C111	1000		77252	BPD-001	
C112	10000		100910	BPD-001	
C113	.22	200	78905	P288N-22	

Note 1. Not used in some versions.
Note 2. Used in chassis KCS94A.

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPL: RCA Victor PART No.	REPL: CENTRALAB PART No.	
R1A	3000Ω	½	100292		
B	1Meg	½			
R2A	1.5Meg	½	100831	AB-742	A
B	Shaft		Not Req.	AK-3	F
R3A	200KΩ	½	100830	B-46	A
B	Shaft		Not Req.	Not Req.	F
R4A	5Meg	½	100832	AB-87	A
B	Shaft		Not Req.	AK-4	K
R5A	2.5Meg	½	100833	AB-83	A
B	Shaft		Not Req.	AK-4	K
	7.5Meg	½	100829		

Note 1. This control used in Chassis KCS94A only.
♦ Concentrikit Equivalent; K-6 Kit, Base Elements

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: RCA Victor PART No.	IRC PART No.
R6	100KΩ	½	502410	BTS-100K
R7	100KΩ	½	502410	BTS-100K
R8	22KΩ	½	502322	BTS-22K
R9	56KΩ	½	502356	BTS-56K
R10	47KΩ	1	512347	BTA-1000
R11	1000Ω	½	502210	BTS-1000
R12	47Ω	½	502047	BTS-47
R13	100KΩ	½	502410	BTS-100K
R14	100KΩ	½	502410	BTS-100K
R15	2700Ω	½	502227	BTS-2700
R16	100KΩ	½	502410	BTS-100K
R17	5600Ω	½	502256	BTS-5600
R18	120Ω	½	502112	BTS-120
R19	470Ω	½	502147	BTS-470
R20	1000Ω	½	502210	BTS-1000
R21	560Ω 5%	½	502156	BTS-560 5%
R22	1000Ω	½	502210	BTS-1000
R23	47KΩ 5%	½	502347	BTS-47K 5%
R24	47KΩ	½	502347	BTS-47K
R25	680Ω	½	502168	BTS-680
R26	390Ω	½	30498	BTS-390
R27	47Ω 5%	½	502047	BTS-47 5%
R28	150KΩ 5%	½	502415	BTS-150K 5%
R29	150KΩ 5%	½	502415	BTS-150K 5%
R30	680Ω	½	502168	BTS-680
R31	18Ω 5%	½	502018	BTS-18 5%
E32	470Ω	½	502147	BTS-470
R33	130Ω 5%	½	502113	BTS-130 5%
R34	47Ω 5%	½	502047	BTS-47 5%
R35	3900Ω 5%	½	502239	BTS-3900 5%
R36	68KΩ	½	502368	BTS-68K
R37	680KΩ	½	502468	BTS-680K
R38	1Meg	½	502510	BTS-1Meg
R39	2200Ω	½	502222	BTS-2200
R40	33KΩ	½	502333	BTS-33K
R41	5600Ω	2	522256	BTB-5600
R42	56KΩ	1	512356	BTA-56K
R43	3300Ω	½	502233	BTS-3300
R44	22KΩ	½	502322	BTS-22K
R45	150KΩ	½	502415	BTS-150K
R46	47KΩ	½	502347	BTS-47K
R47	12KΩ	½	502312	BTS-12K

ESCRIPTIONS
(cont)

REPLACEMENT DATA			NOTES
ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
811-0047	DC-525	5HK-D47	Note 1
	PT401	4TM-P1	
GP2K-331	UC-5333	1FM-333	
GP2K-331	UC-5333	1FM-333	
	PT6133	6TM-S33	
GP3-333-103	PT411	4TM-S1	
GP2-333-222	PT6222	6TM-D22	
	MCB465	MS-247	
817-02	PT6122	6TM-S22	
	PT4147	4TM-S47	
	MCB463	MS-239	
1R5KV-102	PT1621	MB-D1	
GP2K-221	UC-5322	1FM-322	
	MCL482	10GA-Q82	
1R5KV-680	MCL468	10GA-Q68	
	PT401	4TM-P1	
817-02	PT4122	4TM-S22	
	PT4047	2TM-P47	
811-122		MS-212	
1R5KV-471	MCK347	10GA-T47	
	PT601	6TM-P1	
	MCK327	10GA-T27	
	PT16147	MB-S47	
	PT401	4TM-P1	
	PT401	4TM-P1	
3KV-151		30GA-T15	
3KV-151		30GA-T15	
3KV-151		30GA-T15	
GP1K-560	UC-5456	5GA-Q56	
801-001	DC-521	5HK-D1	
801-001	DC-521	5HK-D1	
801-001	DC-521	5HK-D1	
831-471	UC-5347	5GA-T47	
801-001	DC-521	5HK-D1	
801-001	DC-521	5HK-D1	
	PT4022	2TM-P22	Note 2

IRC T No.	MALLORY PART No.	INSTALLATION NOTES
2 ♦	UE413S	Contrast (Panel) Tap at 2850Ω Volume & Switch (Rear) Tap at 250KΩ
8	TA155L	Vertical Hold
eq.	Not Req.	Attach to R2A.
9	U-43	Brightness
eq.	Not Req.	Attach to R3A.
1	TA56L	Height
eq.	Not Req.	Attach to R4A.
9	TA255L	Vertical Linearity
eq.	Not Req.	Attach to R5A. Local Distant-See Note 1

X, P17-105 (Panel)
X, R1-118 (Rear)
(Switch)

RATING		REPLACEMENT DATA		NOTES
OHMS	WATT	RCA Victor PART No.	IRC PART No.	
1000Ω	½	502210	BTS-1000	
10KΩ 5%	½	502310	BTS-10K 5%	
10KΩ 5%	½	502310	BTS-10K 5%	
39KΩ	½	502339	BTS-39K	
47KΩ	½	502347	BTS-47K	
10Meg	½	502610	BTS-10Meg	
330KΩ	½	502433	BTS-330K	
470KΩ	½	502447	BTS-470K	
470Ω	1	512447	BTA-470	
1800Ω	2	522218	BTB-1800	
470KΩ	½	502447	BTS-470K	Note 1
18KΩ	½	502318	BTS-18K	
270KΩ	½	502427	BTS-270K	
1.5Meg	½	502515	BTS-1.5Meg	
1.5Meg	½	502515	BTS-1.5Meg	
390KΩ	½	502439	BTS-390K	
33KΩ	½	502333	BTS-33K	
560KΩ	½	502456	BTS-560K	
3300Ω 5%	½	502233	BTS-3300 5%	
10KΩ	1	512310	BTA-10K	
22KΩ	½	502322	BTS-22K	
18KΩ	½	502318	BTS-18K	
6.8Meg	½	502568	BTS-6.8Meg	
470KΩ	½	502447	BTS-470K	
1Meg	½	502510	BTS-1Meg	
3.9Meg	½	502539	BTS-3.9Meg	Note 1
1Meg	½	502510	BTS-1Meg	Note 1
470KΩ	½	502447	BTS-470K	
18KΩ 5%	½	502318	BTS-18K 5%	
15KΩ	½	502315	BTS-15K	
8200Ω	½	502282	BTS-8200	
150KΩ	½	502415	BTS-150K	
470KΩ	½	502447	BTS-470K	
22KΩ	½	502322	BTS-22K	
22KΩ	½	502322	BTS-22K	
150Ω	1	512115	BTA-150	
560Ω	½			
560Ω	½			
220KΩ	½	502422		
330KΩ	½	502433		
820KΩ	½	502482	BTS-820K	
100KΩ 5%	½	502410	BTS-100K 5%	

RESISTORS (cont)

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	RCA Victor PART No.	IRC PART No.	
R90	82KΩ	½	502382	BTS-82K	
R91	3900Ω	½	502239		
R92	150KΩ 5%	1	512415	BTA-150K 5%	
R93	6.8Meg	½	502568		
R94	47KΩ	½	502347	BTS-47K	
R95	820KΩ	½	502482	BTS-820K	
R96	39KΩ	1	512339	BTS-39K	
R97	1Meg	½	502510	BTS-1Meg	
R98	47Ω	½	502047		
R99	6800Ω	2	522268		
R100	100Ω	2	74015	BW2-100	
R101	270KΩ	½	502427	BTS-270K	
R102	68KΩ	½	502368	BTS-68K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	RCA Victor PART No.	IRC PART No.	
R103	4700Ω	½	502247		
R104	1.8Ω 5%	½	100305	BW½-1.8 5%	
R105	1000Ω	½	502210	BTS-1000	
R106	4000Ω	7	77668	PW7-4000	
R107	38Ω	20	100304		
R108	450Ω Cold 9.5Ω Hot		100118		Note 4
R109	5.6Ω	5	100117		
R110	470KΩ	½	502447	BTS-470K	
R111	1.8Meg	½	502518	BTS-1.8Meg	Note 5
R112	560KΩ	½	502456	BTS-560K	Note 5

Note 1. Not used in some versions.
Note 2. Some versions use a 1000Ω ½W resistor in this application (Mfgr. Part No. 502210).
Note 3. Some versions use a 22KΩ ½W resistor in this application (Mfgr. Part No. 502322).
Note 4. Temperature Compensating.
Note 5. Used in Chassis KCS94A only.
Note 6. Used in Chassis KCS94 only.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA							
		RCA Victor PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	Horiz. Output Trans.	100828	FB419 *①	HV0-36 *①		X094 *①	A-8255 *①	FLY-16 *①	D-50 *①
T2	Vert. Output Trans.	100834	Z1900②③	A-2823②		V307②	A-8145②	26S73	A-108X②
T3A	Yoke(90°)Horiz. (18.5MH)	100586④	DF607⑤	MDF-92⑤		Y90F19/43⑤	DY-16A ⑤	Y-16⑤	Y-41-1⑤
B	Vert. (38MH)								
T4	Width Coil (2.2-18MH)	79144	RF800⑥⑦	MWC-11		201R16	WC-8	WC-18⑥	WC-12⑧

① Drill new mounting hole(s).
② Connect as auto transformer.
③ Use 9 to 1 turns ratio.
④ Includes capacitor C105, resistors R84, R85, 8 contact plugs, RCA part #100477.
⑤ Connect horizontal damping network across terminals #3 and #7. Use original if necessary.
⑥ Enlarge mounting hole.
⑦ Connect to terminals coded #1 and #2.
⑧ Connect to terminals coded red and blue.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	5	9	9		9	5	9	9
	4	7	7		7	4	7	7
	3	5	5		5	4	5	5
	2	3	3		3	2	3	3
	1	1	1		1	1	1	1
Connect Width Coil Across →	2 & 1	3 & 1	3 & 1		3 & 1	2 & 1	3 & 1	3 & 1

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	RCA Victor PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T5	7.8KΩ	3.5Ω	100827	Z1003	A-3020	A-3823	26S48	S-9Z	

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	RCA Victor PART No.	QUAM PART No.	RCA TYPE No.	
SP1	4"	PM	3.5Ω	79696	4A07	223S1	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	RCA Victor PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Match. Trans.	.6Ω	.3Ω	100454				Note 1
L2	Ant. Match. Trans.	.6Ω	.3Ω	100454				Note 1
L3	IF Trap	0Ω						Note 1
L4	Ant. Shunt Coil	0Ω						Note 1
L5	Ant. Shunt Coil	0Ω						Note 1
L6	IF Trap	0Ω						Note 1
L7	FM Trap	0Ω						Note 1
L8	RF Choke	0Ω		77859				Note 2
L9	Ant. Coil	0Ω						Channel 2 - Note 2
L10	Ant. Coil	0Ω		79728				Channel 3 - Note 2
L11	Ant. Coil	0Ω		79716				Channel 4 - Note 2
L12	Ant. Coil	0Ω		79714				Channel 5 - Note 2
L13	Ant. Coil	0Ω		73461				Channel 6 - Note 2
L14	Ant. Coil	0Ω		79727				Channel 8 - Note 2
L15	Ant. Coil	0Ω		71469				Channel 9 - Note 2
L16	Ant. Coil	0Ω		79713				Channel 10 - Note 2
L17	Ant. Coil	0Ω		71472				Channel 11 - Note 2
L18	Ant. Coil	0Ω		79712				Channel 12 - Note 2
L19	Fil. Choke	0Ω		73477				
L20	RF Coil	0Ω		79731				Channel 2 - Note 3
L21	RF Coil	0Ω		79727				Channel 3 - Note 3
L22	RF Coil	0Ω		79717				Channel 4 - Note 3
L23	RF Coil	0Ω						Channel 5 - Note 3
L24	RF Coil	0Ω		73460				Channel 6 - Note 3
L25	RF Coils	0Ω						Channels 7 thru 12-Note 3
L26	RF Coil	0Ω		77921				Channel 13 - Note 3
L27	Mixer Grid Coil	0Ω		79727				Channel 2 - Note 4

RCA VICTOR MODELS 17-PT-6962, U, 17-S-6022, U, 17-S-6025, U, 17-S-6027, U (Ch. KCS94, A)

eries Peak-ng Coil	13Ω		100361	19-3300 *		6155 *	300 Microhenries, wound on 6.8KΩ resi
hunt Peak-ng Coil	17Ω		100362	19-3500		6174	510 Microhenries
Shunt Peak-ing Coil	12Ω		100363	19-3500 ■		6174 ■	510 Microhenries, wound on 1.8KΩ resi
Sound IF	2.4Ω		101220	17-1031		1470	
Ratio Det.	10Ω	.8ΩCT	101219				Tertiary winding -.6
RF Choke	.72Ω		76640	19-1001		4604	1.5 Microhenries

llel with 6.8KΩ resistor.
llel with 1.8KΩ resistor.
Part of complete assembly - includes L1 thru L7 and C6 thru C9. Complete assembly part #100454.
Part of complete assembly - includes stator complete with rotor, L8 thru L18 and C10. Complete
ly part #79724.
Part of complete assembly - includes stator complete with rotor, L20 thru L26, C19 and R12.
te assembly part #79726.
Part of complete assembly - includes stator complete with rotor, L27 thru L33, C20, C23, R14,
l R16. Complete assembly part #79723.
Complete assembly - includes stator complete with rotor and coils.

TRANSFORMER (HORIZ. OSC.)

DC RES.		REPLACEMENT DATA							NOTES
PRI.	SEC.	RCA Victor PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No.	Ram PART No.	Thordarson PART No.	
37Ω		79966A							Tapped ③ 6 Horiz. Osc.
48Ω		100300							Horiz. Wav

FILTER CHOKE

RATINGS			REPLACEMENT DATA					
TOTAL DIRECT URRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ~)	RCA Victor PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
250ADC	49.4Ω	.89HY	100286	C5037 ①	C-2996 ①	C-2326 ①	26C44 ①	C-17X ①

one new mounting hole.

SELENIUM RECTIFIER

RATING		REPLACEMENT DATA						NOTES
CURRENT	RCA Victor PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
.250ADC	100035	1236A	MR300	6S300	6Q4	300	
.250ADC	100035	1236A	MR300	6S300	6Q4	300	

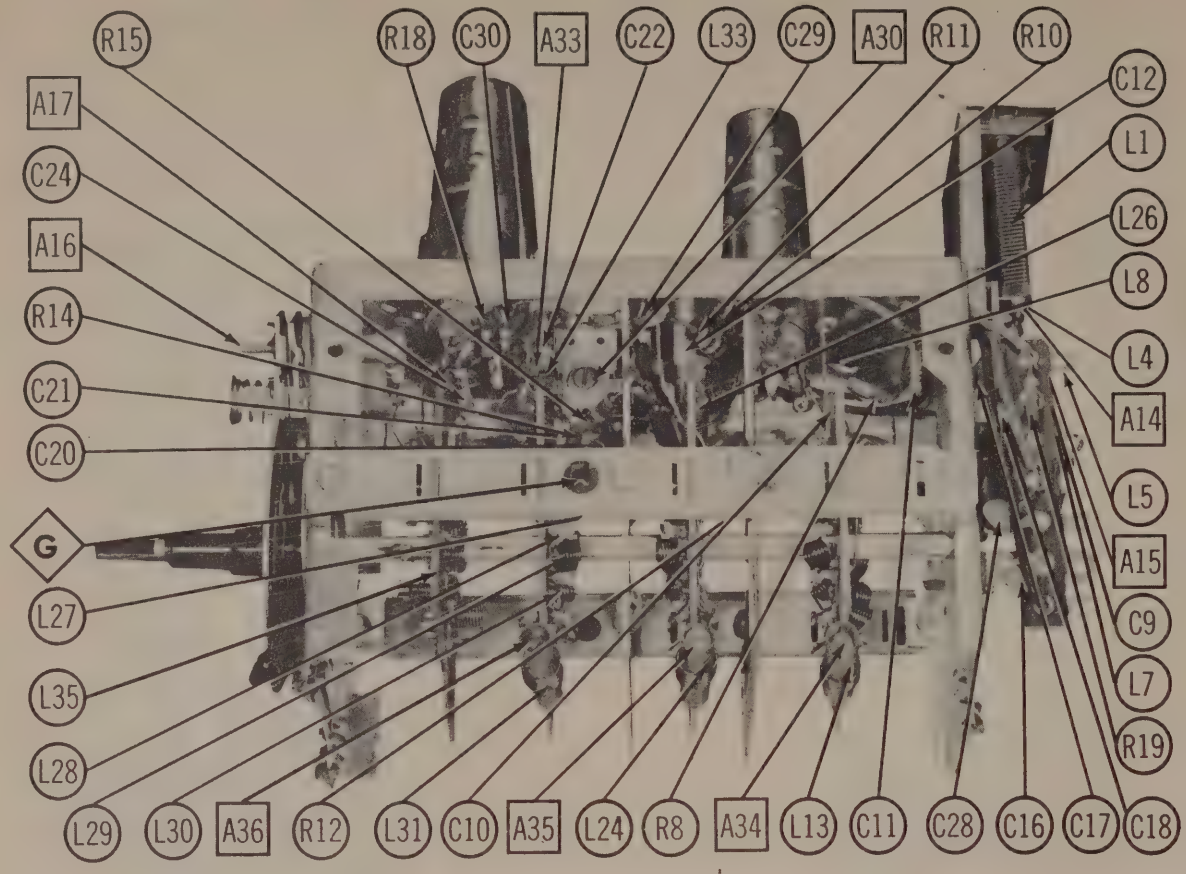
FUSES

TYPE	RATING	REPLACEMENT DATA					
		RCA Victor PART No.		LITTELFUSE PART No.		BUSS PART No.	
		FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
3AG	3/10A 250V	78214	78218	312.300 (3AG 3/10A)	357001	AGC 3/10	4405

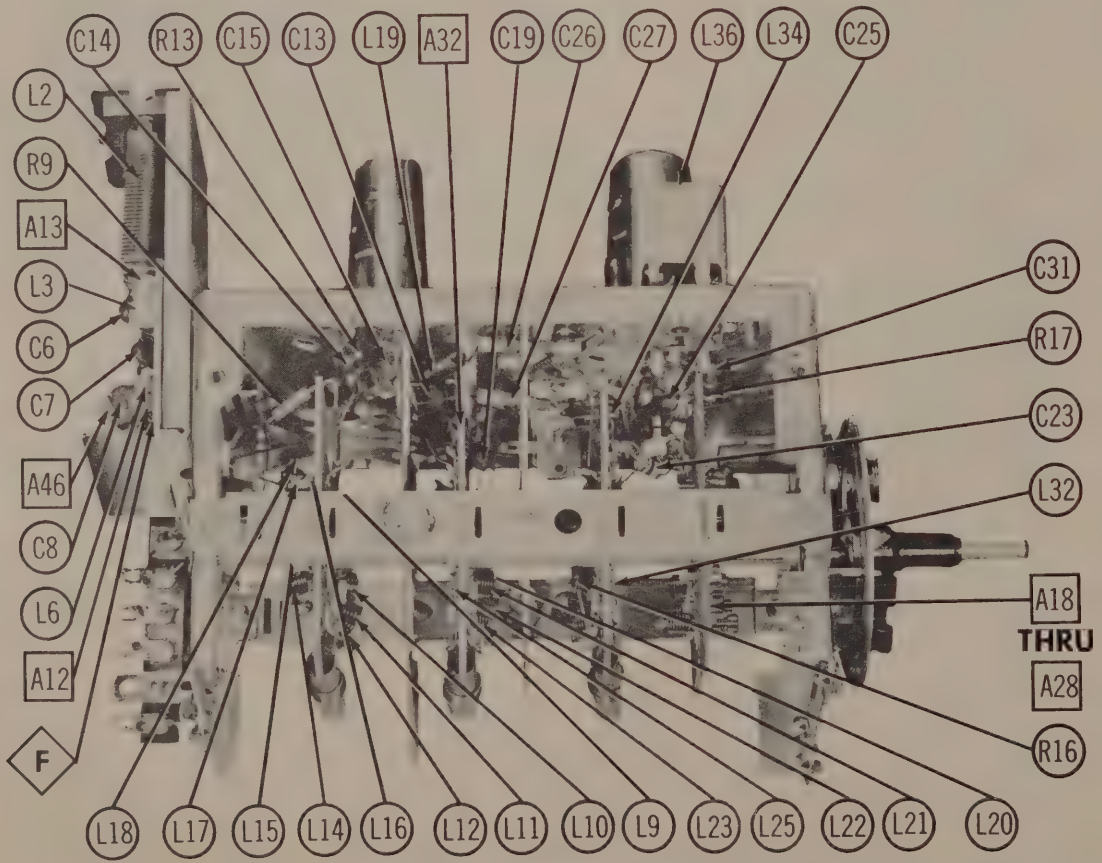
MISCELLANEOUS

PART NAME	RCA Victor PART No.	NOTES
Tuner	KRK32B	VHF - Chassis KCS94
Tuner	KRK29K	VHF - Chassis KCS94A
Tuner	KRK36A	UHF - Chassis KCS94A
Switch	100619	VHF-UHF (Slide type) Chassis KCS94A
Centering Device	100585	
ion Trap	76141	
Trimmer Cap.	100835	Video IF Input Trimmer (5-70MMF)
Trimmer Cap.	71807	Horiz. Drive (10-160MMF)
afety Glass	101026	

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use an isolation transformer to protect the test equipment.
M3 (Fuse) may be removed to prevent shock hazard during alignment. If not removed, the high voltage lead should be taped securely and kept away from the chassis.

VIDEO IF ALIGNMENT USING TUNER KRK32B

Connect the ends of a 1000Ω potentiometer across a 7.5 volt battery capable of withstanding considerable current drain. Connect the negative terminal arm to point Ⓐ. Set potentiometer arm to obtain -3.5 volts at point Ⓐ. Connect the positive terminal to chassis. Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.0015MFD	High side to point Ⓑ. Low side to chassis.	Not used	44.5MC	Any unused channel	USE VTVM. DC probe to point Ⓒ. Common to chassis.	A1	Attenuate generator output to maintain not more than -3 volts on VTVM. Adjust for maximum deflection.
2.	"	"	"	45.5MC	"	"	A2	"
3.	"	"	"	43.0MC	"	"	A3	"
4.	"	"	"	47.25MC	"	"	A4	Increase generator output to maintain -3 volts on VTVM. Adjust for MINIMUM deflection.
5.	"	High side to point Ⓑ. Low side to tuner chassis.	44MC (10MC Swp)	42.5MC 45.75MC	4	Vert. Amp. of scope thru detector (Fig. 1) to pin 5 (plate) of 1st. Video IF Amp. tube (V3). Low side to chassis.	A5, A6, A7	Adjust bias to read -3.5 volts at point Ⓐ. Clip a carbon 330Ω resistor from pin 2 (grid) of 3rd. video IF amplifier (V5A) to chassis. Connect a 180Ω carbon resistor from plate to screen (pins 5 and 6) of 1st. video IF amplifier tube (V3). Preset A5 (trimmer) to minimum capacity. If a separate signal generator is used for marker couple it loosely to detector as in Fig. 1. Attenuate output of sweep generator to give 0.5 volts peak to peak on scope. Adjust A6 and A7 for maximum gain with 45.75MC marker at 75% of maximum response as in Fig. 2. Adjust A5 to place 42.5MC marker at 70% response on curve as in Fig. 2. Disconnect the 180Ω and 330Ω resistors. Remove scope and detector from pin 5 of V3.
6.	"	"	"	42.5MC 45.0MC 45.75MC	4	Vert. Amp. to point Ⓒ. Low side to chassis.	A1, A2, A3	Attenuate output of sweep generator to obtain 3 to 5 volts peak to peak on scope. If a separate signal generator is used for a marker, couple it loosely to pin 1 (grid) of 1st. video IF amplifier tube (V3). Retouch A1, A2 and A3 if necessary to obtain response curve similar to Fig. 3.
7.	"	"	"	41.25MC	"	"	A1, A3	Increase sweep generator output ten times and notice attenuation at 41.25MC. Adjust A1 and A3 to set 41.25MC marker at approximately 30 times down with response curve as shown in Fig. 3.
8.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	"	42.5MC 45.0MC 45.75MC	All VHF channels separately	"	A1, A2	Slightly readjust A1 and A2 to correct any overall tilt while switching from channel to channel as in Fig. 3. Couple marker generator loosely to first video IF Amp. tube grid. Continue alignment with step 13.

VIDEO IF ALIGNMENT USING KRK29K/36A TUNER UNIT

Same instructions as under "Video IF Alignment Using Tuner KRK32B"

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.0015MFD Ceramic Capacitor	High side to point Ⓑ. Low side to chassis.	Not used	44.5MC	Any unused channel	USE VTVM. DC probe to point Ⓒ. Common to chassis.	A1	Attenuate generator output to maintain not more than -3 volts on VTVM. Adjust for maximum deflection.
2.	"	"	"	45.5MC	"	"	A2	"
3.	"	"	"	43.0MC	"	"	A3	"
4.	"	"	"	47.25MC	"	"	A4	Increase generator output to maintain -3 volts on VTVM. Adjust for MINIMUM deflection.
5.	"	High side to point Ⓑ. Low side to tuner chassis.	44MC (10MC Swp)	42.5MC 45.75MC	4	Vert. Amp. of scope thru detector (Fig. 1) to pin 5 (plate) of 1st. video IF amp. tube (V3). Low side to chassis.	A5, A6, A7	Adjust bias to read -3.5 volts at point Ⓐ. Clip a carbon 330Ω resistor from pin 2 (grid) of 3rd. video IF amp. tube (V5A) to chassis. Connect a 180Ω carbon resistor from plate to screen (pins 5 and 6) of 1st. video IF amp. tube (V3). Preset A5 (trimmer) to minimum capacity. If a separate signal generator is used for marker couple it loosely to detector as in Fig. 1. Attenuate output of sweep generator to give 0.5 volts peak to peak on scope. Adjust A6 and A7 for maximum gain with 45.75MC marker at 75% of maximum response as in Fig. 2. Adjust A5 to place 42.5MC marker at 70% response on curve as in Fig. 2. Disconnect the 180Ω and 330Ω resistors. Remove scope and detector from pin 5 of V3.
6.	"	"	"	42.5MC 45.0MC 45.75MC	4	Vert. Amp. to point Ⓒ. Low side to chassis.	A1, A2, A3	Attenuate output of sweep generator to obtain 3 to 5 volts peak to peak on scope. If a separate signal generator is used for a marker, couple it loosely to pin 1 (grid) of 1st. video IF amp. tube (V3). Retouch A1, A2 and A3 if necessary to obtain response curve similar to Fig. 3.

VIDEO IF ALIGNMENT USING KRK29K/36A TUNER UNIT (CONT.)

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	.0015MFD	High side to point Ⓑ. Low side to chassis.	44MC (10MC Swp)	41.25MC	4	Vert. Amp. to point Ⓒ. Low side to chassis.	A1, A3	Increase sweep generator output ten times and notice attenuation at 41.25MC. Adjust A1 and A3 to set 41.25MC marker at approximately 30 times down with response curve as shown in Fig. 3.
8.	Two 130Ω Carbon Resistors	Across VHF antenna terminals with 130Ω in each lead.	"	42.5MC 45.0MC 45.75MC	All VHF channels separately	"	A1, A2	SLIGHTLY readjust A1 and A2 to correct any overall tilt while switching from VHF channel to VHF channel (Fig. 3).
9.	10000Ω Carbon Resistor in series with .0015MFD ceramic capacitor	High side to front terminal of 1N82 crystal holder. Low side to tuner case. Use very short leads.	797MC (10MC Swp)	45.75MC 42.5MC	Between channels 68 and 69.	Vert. Amp. thru detector (Fig. 1) to junction of 220Ω and .0015MFD (see remarks). Low side to chassis.	A8, A9	Set tuner to UHF position. Connect a 220Ω in series with a .0015MFD capacitor (ceramic) between pin 1 (plate) of 4BQ7A and chassis with the capacitor end connected to pin 1 of 4BQ7A and resistor end to chassis. If VHF generator is used as a marker, couple it loosely to detector (Fig. 1). Connect a second bias supply to point Ⓓ. Positive side to tuner case. Adjust for -3 volts at point Ⓓ. Attenuate sweep generator for 0.5 volts peak to peak on scope. Adjust A8 and A9 for maximum gain as in Fig. 4.
10.	"	"	"	"	"	Vert. Amp. thru detector (Fig. 1) to point Ⓔ. Low side to chassis.	A10, A11	Tuner in UHF position. Loosely couple marker generator to detector (Fig. 1). If necessary, adjust A10 and A11 to place 45.75MC marker at peak of curve with MINIMUM tilt. Remove 220Ω resistor and .0015MFD capacitor from pin 1 of 4BQ7A tube. Remove detector and scope from point Ⓔ.
11.	Two 130Ω Carbon Resistors	Across antenna (VHF) terminals with 130Ω in each lead.	44MC (10MC Swp)	42.5MC 45.0MC 45.75MC 46.5MC	Check all VHF channels	Vert. Amp. to point Ⓒ. Low side to chassis.	A1, A2	Couple marker generator loosely to first video IF amplifier grid. Check for response curve similar to Fig. 3 on all VHF channels. SLIGHTLY retouch A1 and A2 if necessary to correct for any overall tilt as in step 8.
12.	300Ω pad (Fig. 5)	Across UHF antenna terminals thru 300Ω pad (Fig. 5).	See freq. chart of all UHF channels	"	Check all UHF channels	"	A10, A11	Couple marker generator loosely to first video IF amplifier grid. Check for response curve similar to Fig. 3 on all UHF channels. If necessary, SLIGHTLY retouch A10 and A11 to correct for any overall tilt. Do not retouch A1, A2, A3, A6, A7, A8 or A9 in this step. Remove all test equipment. Disconnect both bias supplies.

KRK32B, KRK29K/36A ANTENNA MATCHING UNIT ALIGNMENT

The antenna matching unit has been properly aligned at the factory. The RF unit is aligned with a particular antenna matching unit in place. If a new antenna unit is installed, the RF unit should be realigned. Alignment should not be attempted without the proper alignment facilities. The FM trap adjustment (A46) which is located on the antenna matching unit may be adjusted without seriously affecting the RF alignment. Disconnect the lead from the FM trap (L7) to the channel selector switch. Use a short jumper to connect point Ⓕ on the matching unit through a .001MFD capacitor to pin 1 (grid) of second video IF amplifier tube (V4). Remove the first video IF amplifier tube (V3) from its socket. Cover of the matching unit must be in place during alignment.
Connect the negative terminal of potentiometer arm of bias supply to point Ⓐ. Positive terminal to chassis. Set the potentiometer arm to obtain -5 volts at point Ⓐ on VTVM. Note: Adjustments A12 thru A15 are adjusted by expanding or compressing coil turns, except in antenna matching units in which C6, C7 and C8 are variable capacitors. C6 would be adjustment A13. C7 would be adjustment for A14 and A15. C8 would be adjustment A12.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
13.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	Not used	45.75MC (400∿Mod)	Any	Vert. Amp. to point Ⓒ. Low side to chassis.	A12	Set scope gain to maximum and adjust for MINIMUM 400∿ indication on scope.
14.	"	"	"	41.25MC (400∿Mod)	"	"	A13	"
15.	300Ω Pad (Fig. 5)	Across antenna terminals thru 300Ω pad (Fig. 5).	50MC (20MC Swp)	50MC 52MC 53MC 60MC	"	Vert. Amp. thru detector probe (Fig. 1) to point Ⓕ. Low side to chassis.	A14, A15	Remove the .001MFD capacitor from point Ⓕ to pin 1 of V4. Connect a 300Ω, ½ watt carbon resistor from point Ⓕ to chassis. Adjust A14 and A15 to obtain response curve similar to Fig. 6. Repeat steps 13, 14 and 15 until no further improvement is noted. Remove the 300Ω resistor and the detector probe between point Ⓕ and chassis. Replace V3 in its socket.

KRK32B TUNER ALIGNMENT

An RF unit which is operative and requires only minor touch up adjustments will require no presetting of adjustments.
This unit is properly aligned at the factory and under normal use should not require alignment unless components are changed to effect alignment.
When complete alignment is necessary make the following pre - adjustments.

1. Turn A6 so that slug is all the way out.
2. Preset A16 all the way out.
3. Set channel 7 thru 13 slugs one turn from tight.
4. Disconnect the link from terminals of converter plate transformer (L36) and shunt the terminals of L36 with a 39Ω carbon resistor.

Tuner alignment as outlined below requires the use of a heterodyne frequency meter. The limits of oscillator injection voltage are 2 volts minimum and 5.5 volts maximum measured at point Ⓖ with a VTVM. Connect negative terminal of potentiometer arm of one of the bias supplies to point Ⓓ. Positive side to tuner chassis. Adjust for -3.5 volts bias at point Ⓓ.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
16.	Direct	RF input of heterodyne freq. meter to end of insulated wire inserted in hole provided for adjustment of A30. Be careful that the wire does not touch any of the tuned circuits as this may cause oscillator shift.	Not used	Set freq. meter to 227MC	8	Not used	A16	Turn fine tuning control to its mid-range position. Adjust A16 for audible beat on frequency meter.

17. If channel 8 oscillator frequency cannot be reached by adjustment of A16, switch to channel 13 and adjust A17 for channel 13 oscillator frequency. Switch to channel 12 and adjust A18 for channel 12 oscillator frequency. Continue to channel 8. Adjust proper oscillator trimmer to obtain oscillator frequency on each channel. Also on channel 8 adjust A16 for channel 8 oscillator frequency. Switch to channel 13 and adjust A17, then back to channel 8 and again adjust A16.

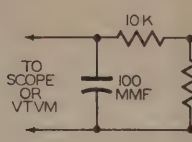


FIG. 1

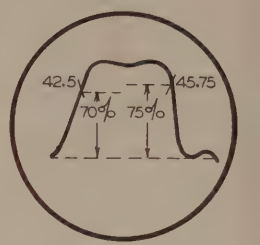


FIG. 2

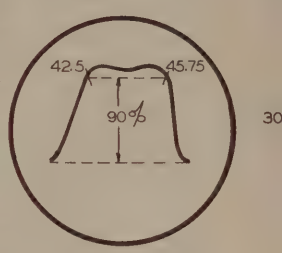


FIG. 4

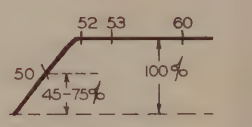


FIG. 6

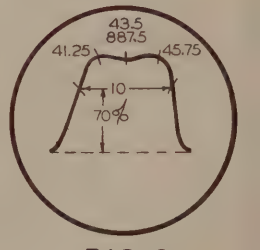
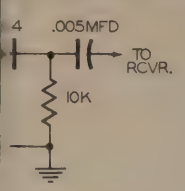


FIG. 8

CTIONS (cont)



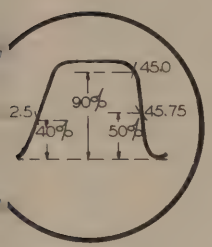


FIG. 3

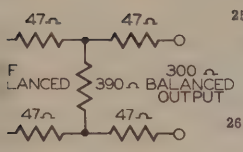


FIG. 5

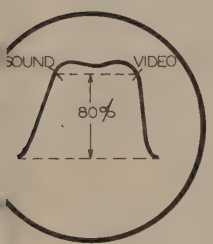


FIG. 7

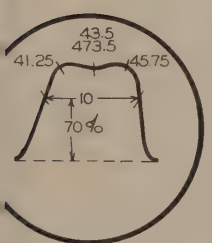


FIG. 9

KRK32B TUNER ALIGNMENT (CONT.)

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
18	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	183MC (10MC Swp)	181.25MC 185.75MC	8	Vert. Amp. to point (G). Low side to chassis.	A29, A30, A31	Set scope to maximum gain for usable indicatinn on scope. Adjust A29, A30 and A31 for response curve similar to Fig. 4. A29 affects bandpass. A31 affects the tilt. A30 affects the overall response bandwidth.
19		Connect frequency meter as in step 16.	Not used	Freq. meter to 257MC	13	Not used	A17	Turn fine tuning control to its mid-range position. Adjust A17 for audible beat. Turn A17 an additional turn in the same direction and readjust A16 to again obtain an audible beat.
20	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	"	Vert. Amp. to point (G). Low side to chassis.	A32, A33	Adjust for proper response as shown in Fig. 4.
21	Connect the DC probe of a VTVM to point (G). Common to chassis. Check oscillator injection voltage. Check oscillator tracking on channels 8 thru 13 if voltage is not within limits. Check V2 by replacing 5U8 tube. If voltage is still off, replace oscillator coupling capacitor (C23). If either is replaced, repeat oscillator tracking procedure for channels 8 thru 13.							
22		Connect frequency meter as in step 16.	Not used	Freq. meter to 227MC	8	Not used	A16	Check for audible beat on frequency meter If necessary, adjust A16 for proper frequency.
23	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	183MC (10MC Swp)	181.25MC 185.75MC	"	Vert. Amp. to point (G). Low side to chassis.	A29, A30, A31	If necessary retouch A29, A30 and A31 to obtain response as in Fig. 4. If A31 required adjustment, turn off generator and switch back to channel 13 and check oscillator injection voltage as in step 21. If necessary repeat steps 20, 21 and 22 until proper response is obtained.
24		Connect frequency meter as in step 16.	Not used	Freq. meter to 129MC	6	Not used	A24	Set fine tuning control to its mid-range position. Adjust A24 for audible beat on frequency meter.
25	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	85MC (10MC Swp)	83.25MC 87.75MC	"	Vert. Amp. to point (G). Low side to chassis.	A34, A35, A36	Adjust for response curve similar to Fig. 7. Check oscillator injection as in step 24. A34 affects maximum amplitude of curve midway between markers. A35 affects freq. bandpass. A36 affects tilt (providing A34 has been properly adjusted).
26	"	"	85MC (10MC Swp)	83.25MC 87.75MC	"	"		Check for response similar to Fig. 7. Check oscillator injection voltages for each channel at point (G). If markers fall below 80% on any one channel, retouch A34, A35 and A36 to obtain response curves within proper limits.
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			
27	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response similar to Fig. 7. Check oscillator injection voltages for each channel at point (G). If markers fall below 80% on any one channel, retouch A29, A30 and A31 to obtain response curves within proper limits.
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
28		Connect frequency meter as in step 16.	Not used	Freq. meter to 257MC	13	Not used	A17	Adjust individual channel oscillator slug for audible beat on each channel. Recheck oscillator injection voltage on each channel at point (G) to verify that the voltages are within limits, 2 volts MINIMUM and 5.5 volts maximum.
				251MC	12		A18	
				245MC	11		A19	
				239MC	10		A20	
				233MC	9		A21	
				227MC	8		A22	
				221MC	7		A23	
				129MC	6		A24	
				123MC	5		A25	
				113MC	4		A26	
				107MC	3		A27	
				101MC	2		A28	

KRK29K/36A VHF TUNER ALIGNMENT

Same instructions as under "KRK32B Tuner Alignment".

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
29	Direct	High side to point (F). Low side to chassis.	Not used	43.5MC (400~Mod)	2	Vert. Amp. to point (B). Low side to chassis.	A37	Short out tuner AGC at point (D). Adjust scope for maximum gain. Adjust A37 for MINIMUM 400~ indication on scope. If necessary A37 may be adjusted in the field to provide additional rejection of a specific frequency. Exercise care so that A37 is not tuned into channel 2 reducing that channel's sensitivity. Remove short from tuner AGC at point (D).
30		RF input of heterodyne frequency meter to end of insulated wire inserted in hole provided for adjustment of A30. Be careful that wire does not touch any of the tuned circuits as this may cause oscillator shift.	"	Set freq. meter to 227MC	8	Not used	A38, A39, A16	Preset A38 to read -3 volts at point (G). Turn fine tuning control fully clockwise. Adjust bias to read -4 volts at point (D). Adjust A39 for audible beat on frequency meter. Adjust A16 clockwise until beat note just begins to change, then turn one full turn in same direction. Return fine tuning control to its mid-range position.
31	Note: If channel 8 oscillator frequency cannot be reached by adjustment of A39, switch to channel 13 and adjust A17 for channel 13 oscillator frequency. Switch to channel 12 and adjust A18 for channel 12 oscillator frequency. Continue to channel 8. Adjust proper oscillator trimmer to obtain oscillator frequency on each channel. Also, on channel 8 adjust A39 for channel 8 oscillator frequency. Switch back to channel 13 and adjust A17, then back to channel 8 and again adjust A39.							

ALIGNMENT INSTRUCTIONS (cont)

KRK29K/36A VHF TUNER ALIGNMENT (CONT.)

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
32.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	183MC (10MC Swp)	181.25MC 185.75MC	8	Vert. Amp. to point Ⓖ. Low side to chassis.	A29, A30, A31, A40	Set A6 fully counter clockwise. Set scope gain to maximum and attenuate generator output for minimum input signal that will produce usable pattern on scope. Adjust for response similar to Fig. 4. Adjust A40 for maximum amplitude between markers. A29 affects bandpass. A31 affects tilt (when A40 is properly adjusted). A30 affects the response bandwidth.
33.	Connect the DC probe of a VTVM to point Ⓖ. Common to chassis. Adjust A38 for negative 3 volts at point Ⓖ. Repeat steps 31 and 32.							
34.		Connect frequency meter as in step 30.	Not used	Freq. meter to 257MC	13	Not used	A17	Rotate fine tuning control maximum clockwise. Adjust A17 for maximum audible beat on freq. meter. SLIGHTLY overshoot the adjustment an additional turn in the same direction, then adjust A16 to again obtain an audible beat.
35.	Two 130Ω Carbon Resistors	Across VHF antenna terminals with 300Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. to point Ⓖ. Low side to chassis.	A32, A33	Adjust for proper response as shown in Fig. 4. Turn off generator and check oscillator voltage at point Ⓖ using VTVM as in step 33. If A38 required readjustment turn sweep generator back on and recheck channel 13 response. If necessary, retouch A32 and A33 for desired response.
36.		Connect frequency meter as in step 30.	Not used	Freq. meter to 227MC	8	Not used	A16	Check for audible beat on frequency meter. If necessary adjust A16 for proper oscillator frequency.
37.	Two 130Ω Carbon Resistors	Across VHF antenna terminals with 130Ω in each lead.	183MC (10MC Swp)	181.25MC 185.75MC	"	Vert. Amp. to point Ⓖ. Low side to chassis.	A29, A30, A31, A40	If necessary retouch A29, A30, A31 and A40 to obtain response similar to Fig. 4. If A31 required adjustment, turn off generator and switch to channel 13 and check oscillator injection voltage as in step 33. If necessary, repeat steps 35, 36 and 37 until proper response is obtained.
38.		Connect Frequency meter as in step 30.	Not used	Freq. meter to 129MC	6	Not used	A24	Set fine tuning control to its mid-range position. Adjust A24 for audible beat on frequency meter.
39.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	85MC (10MC Swp)	83.25MC 87.75MC	"	Vert. Amp. to point Ⓖ. Low side to chassis.	A34, A35, A36	Adjust for response curve similar to Fig. 7. Check oscillator injection voltage as in step 33. Readjust A38 if necessary.
40.	If A38 required adjustment, switch receiver and generator to channel 8. Readjust A31 for response similar to Fig. 4. Recheck A16 and A39 for proper oscillator frequency as in step 30.							
41.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	85MC (10MC Swp)	83.25MC 87.75MC	6	Vert. Amp. to point Ⓖ. Low side to chassis.		Check for response similar to Fig. 7. Check oscillator injection voltage for each channel at point Ⓖ. If markers fall below 80% on any one channel, retouch A35 and A36 to obtain response curves within proper limits.
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			
42.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response curve similar to Fig. 7. Check oscillator injection voltages for each channel at point Ⓖ. If markers fall below 80% on any one channel retouch A29, A30 and A31 to obtain response curves within proper limits.
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
43.		Connect frequency meter as in step 30.	Not used	Freq. meter to 257MC	13	Not used	A17	Adjust individual channel oscillator slug for audible beat on each channel. Recheck oscillator injection voltage on each channel at point Ⓖ to verify that the voltages are within limits 2 volts MINIMUM and 5.5 volts maximum.
				251MC	12		A18	
				245MC	11		A19	
				239MC	10		A20	
				233MC	9		A21	
				227MC	8		A22	
				221MC	7		A23	
				129MC	6		A24	
				123MC	5		A25	
				113MC	4		A26	
				107MC	3		A27	
				101MC	2		A28	

300Ω pad (Fig. 5)	Across UHF antenna terminals thru 300Ω pad (Fig. 5).	(20MC Swp)	41.25MC 43.5MC 45.75MC	(Rotate dial to 164°)	point Ⓗ. Low side to chassis.	A43	nal mar MC Adj cou MC coi
"	"	473.5MC (20MC Swp)	473.5MC 41.25MC 43.5MC 45.75MC	14 (Rotate dial to 5°)	"	A44, A45	Adj wit MC in lat ra

6. Repeat steps 44 and 45 until response curves as in Fig. 8 and Fig. 9 are obtained. With perfect tracking the thre the response curve. They may ride down the curve as far as 70% without seriously affecting alignment. If they fa of the RF plates is necessary to correct tracking. It is necessary to remove shield cover to knife RF plates. Alw tuning in the lower frequency to avoid affecting the tracking above the point of knifing. A check of which sectio touching the plates with the knifing tool while observing the response.

7. Connect the DC probe of a VTVM to point Ⓗ. Common to chassis. Set VTVM to 1.5 volts on DC scale. Tune between .03 and .35 volts should be obtained. Voltages outside these limits are an indication low B+ voltage, lo or an oscillator tube operating outside its allowable limits. Connect the DC probe of VTVM to point Ⓘ, which to chassis. VTVM should read .5 and 2.5 volts. Readings outside of these limits will cause crystal currents ou cases replacement of the oscillator tube should follow. If the oscillator tube is replaced, recalibration of the hi bands is required as outlined above.

FM TRAP ADJUSTMENT

Tune in a local TV station in which interference is noticed. Adjust A46 for minimum interference in picture.

SOUND IF ALIGNMENT

Ground pin 2 (grid) of 3rd video IF amplifier tube (V5A) to chassis.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	
48.	.01MFD	High side to pin 7 (grid) of video output tube (V6A). Low side to chassis.	4.5MC (Unmod)	Any unused channel	DC probe to point Ⓙ. Common to chassis.	A49	Adjust for m chassis end
49.	"	"	"	"	"	A47, A48	Adjust for m at end of co
50.	"	"	"	"	"	A49	Adjust for reading wil setting. Re

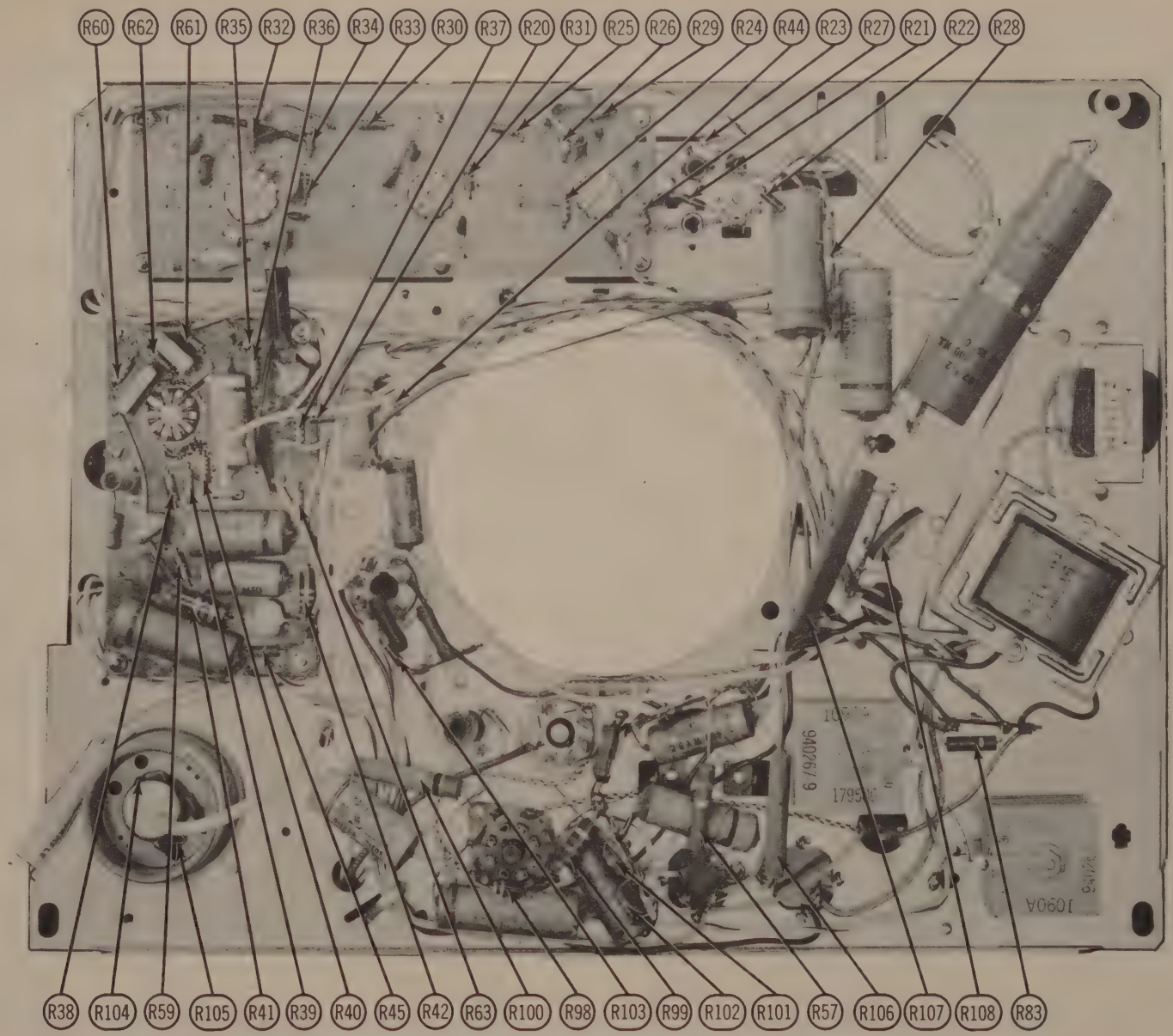
4.5MC TRAP ALIGNMENT

Ground pin 2 (grid) of 3rd video IF amplifier tube (V5A) to chassis when properly adjusted. core will be away

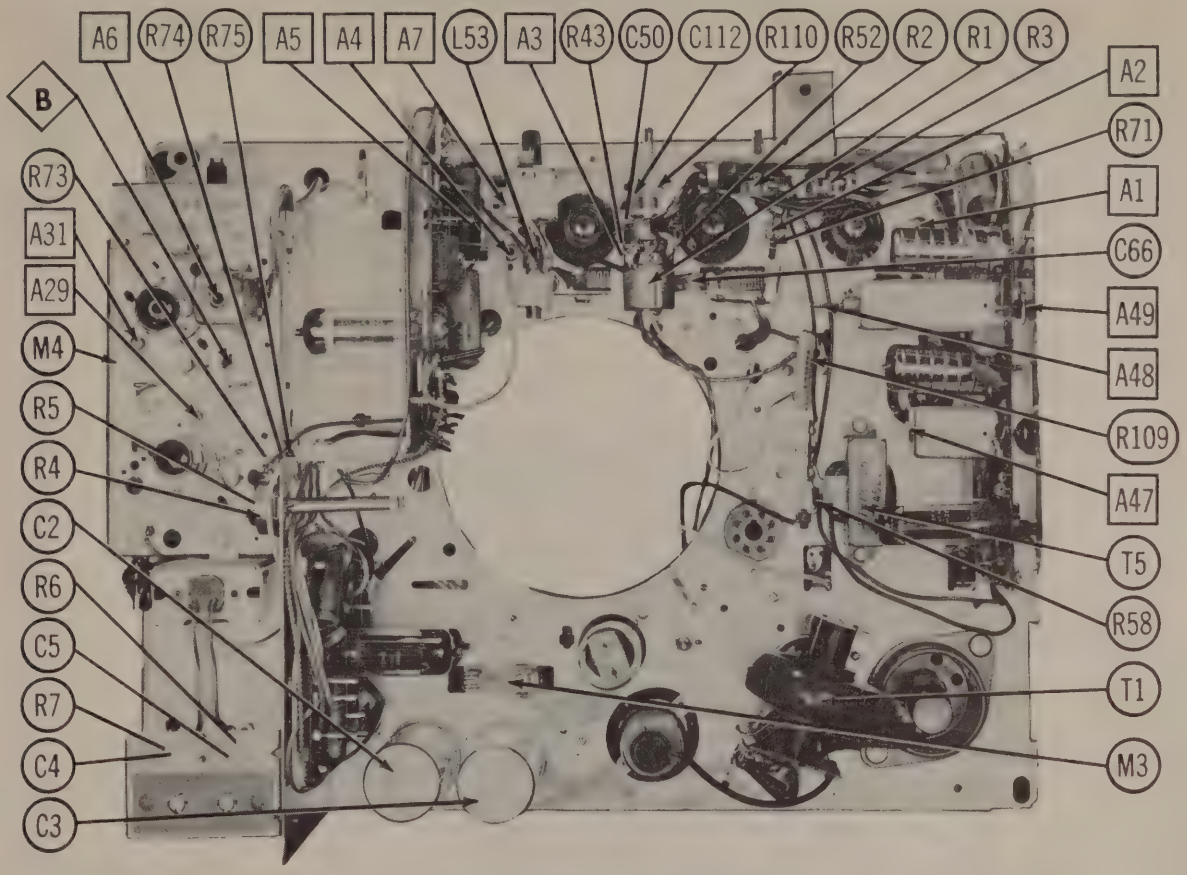
	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	
51.	.01MFD	High side to pin 7 (grid) of video output tube (V6A) Low side to chassis.	4.5MC (Unmod)	Any unused chassis.	DC probe thru detector (Fig. I) to pin 11 (cathode) of picture tube. Common to chassis.	A50	Increase o for MINIM pin 2 of V5 and bright the fine tu is noted in 4.5MC bea

TELEVISION CHANNEL FREQUENCIES

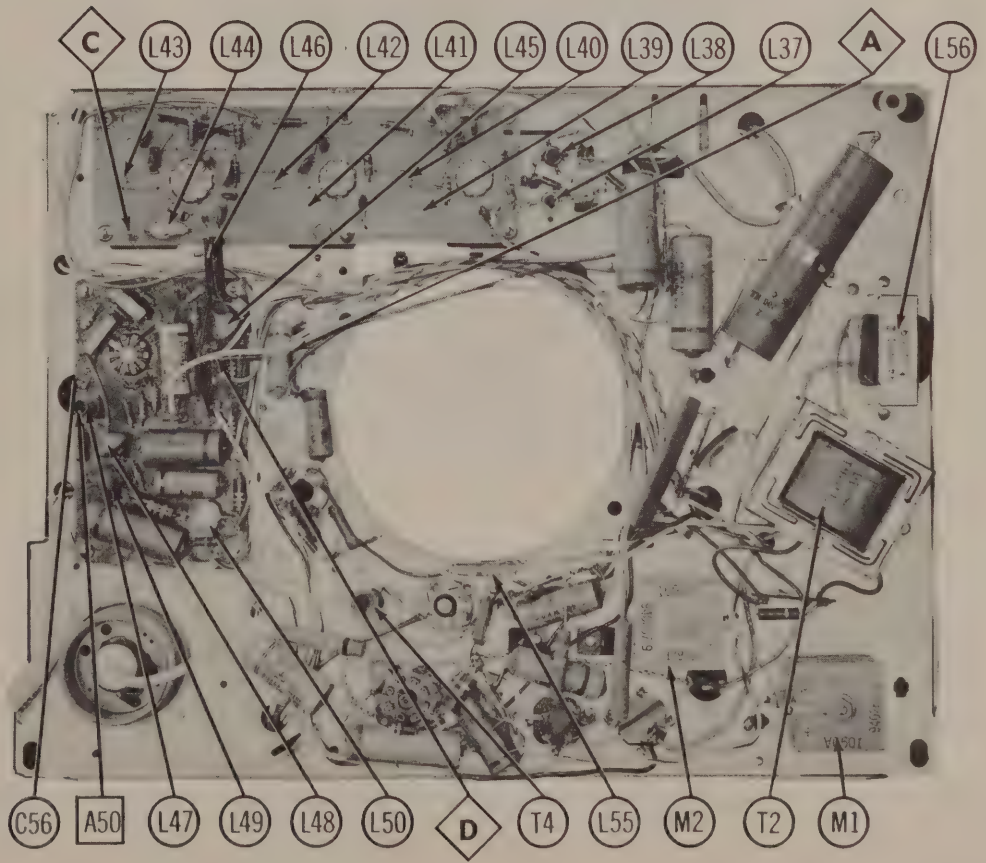
Channel No.	Frequency Band (Mc)	Video Carrier	Sound Carrier
2	54-60	55.25	59.75
3	60-66	61.25	65.75
4	66-72	67.25	71.75
5	76-82	77.25	81.75
6	82-88	83.25	87.75
7	174-180	175.25	179.75
8	180-186	181.25	185.75
9	186-192	187.25	191.75
10	192-198	193.25	197.75
11	198-204	199.25	203.75
23	524-530	525.25	529.75
24	530-536	531.25	535.75
25	536-542	537.25	541.75
26	542-548	543.25	547.75
27	548-554	549.25	553.75
28	554-560	555.25	559.75
29	560-566	561.25	565.75
30	566-572	567.25	571.75
31	572-578	573.25	577.75
32	578-584	579.25	583.75
33	584-590	585.25	589.75
44	650-656	651.25	655.75
45	656-662	657.25	661.75
46	662-668	663.25	667.75
47	668-674	669.25	673.75
48	674-680	675.25	679.75
49	680-686	681.25	685.75
50	686-692	687.25	691.75
51	692-698	693.25	697.75
52	698-704	699.25	703.75
53	704-710	705.25	709.75
54	710-716	711.25	715.75



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



CHASSIS TOP VIEW

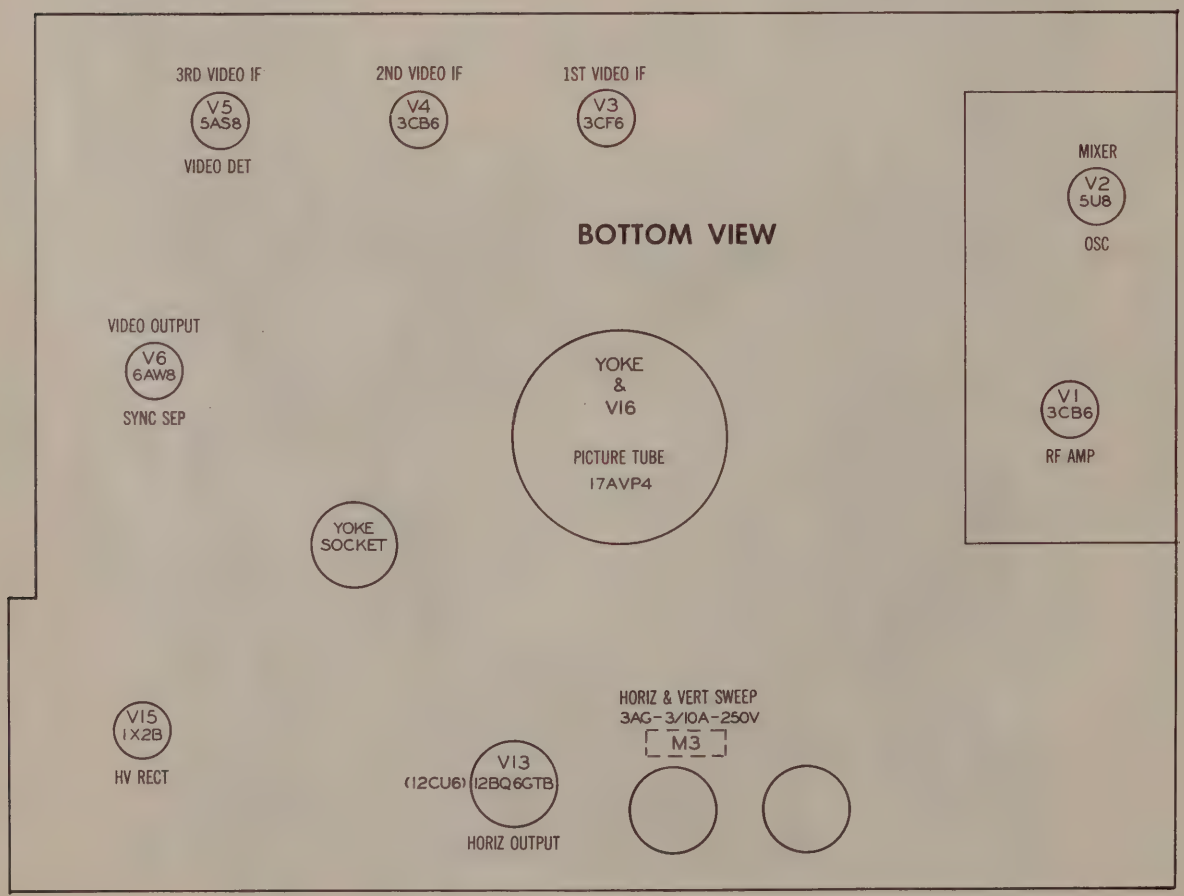


CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

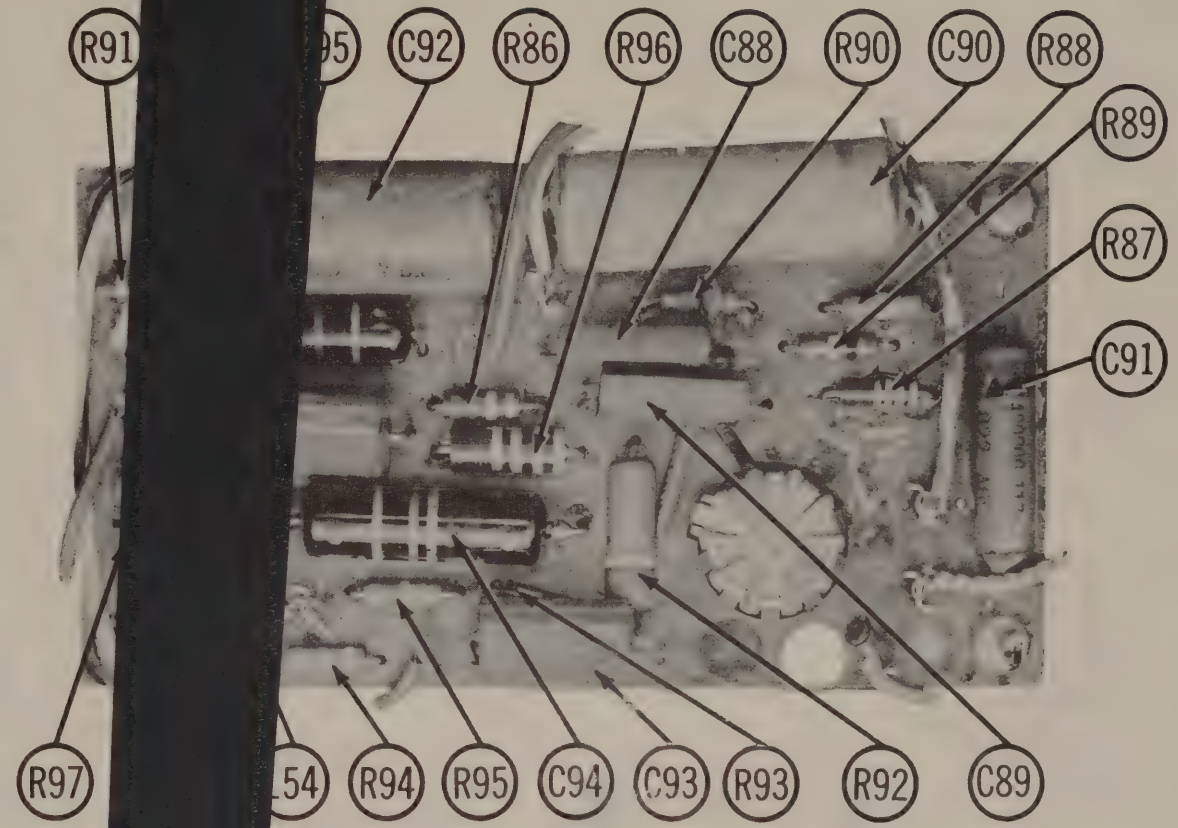
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	3CB6	750KΩ	47Ω	2Ω	3Ω	† 1.5KΩ	† 30KΩ	0Ω		
V 2	5U8	† 6.1KΩ	100KΩ	INF	4Ω	3Ω	INF	0Ω	INF	INF
V 3	3CF6	750KΩ	47Ω	12Ω	11Ω	▲ 680Ω	▲ 680Ω	0Ω		
V 4	3CB6	90KΩ	▲ 18Ω	11Ω	10Ω	† 750Ω	† 150Ω	INF		
V 5	5AS8	† 4.5KΩ	.9Ω	180Ω	10Ω	9Ω	3.9KΩ	0Ω	47Ω	† 4.5KΩ
V 6	6AW8	0Ω	3Meg	† 390KΩ	7Ω	9Ω	33Ω	1Meg	† 56KΩ	† 5.6KΩ
V 7	5U8	† 330KΩ	47KΩ	† 17KΩ	6Ω	5Ω	† 5KΩ	0Ω	0Ω	10Meg
V 8	3AL5	INF	INF	5Ω	4Ω	10KΩ	0Ω	10KΩ		
V 9	5AQ5	470KΩ	470Ω	6Ω	7Ω	† 2.2KΩ	† 1.8KΩ	470KΩ		
V 10	6CG7	† 18KΩ	33KΩ	0Ω	14Ω	15Ω	▲ 1.8Meg	2.5Meg	0Ω	0Ω
V 11	5AQ5	2.5Meg	0Ω	15Ω	17Ω	† 580Ω	† 200Ω	2.5Meg		
V 12	6CG7	† 50Ω	1.3Meg	180KΩ	12Ω	14Ω	† 39KΩ	250KΩ	0Ω	0Ω
V 13	12BQ6GTB 12CU6	NC	17Ω	NC	† 6.8KΩ	1Meg	TP	20Ω	100Ω	TOP CAP ▲ 18Ω
V 14	12AX4GTA	NC	NC	850KΩ	NC	† 50Ω	NC	22Ω	20Ω	
V 15	1X2B		PINS 1 - 9 HAVE INF RESISTANCE							TOP CAP ▲ 370Ω
V 16	17AVP4	0Ω	22KΩ	PIN 6 † 4KΩ	PIN 10 ▲ 350KΩ	PIN 11 † 200KΩ	PIN 12 2Ω			

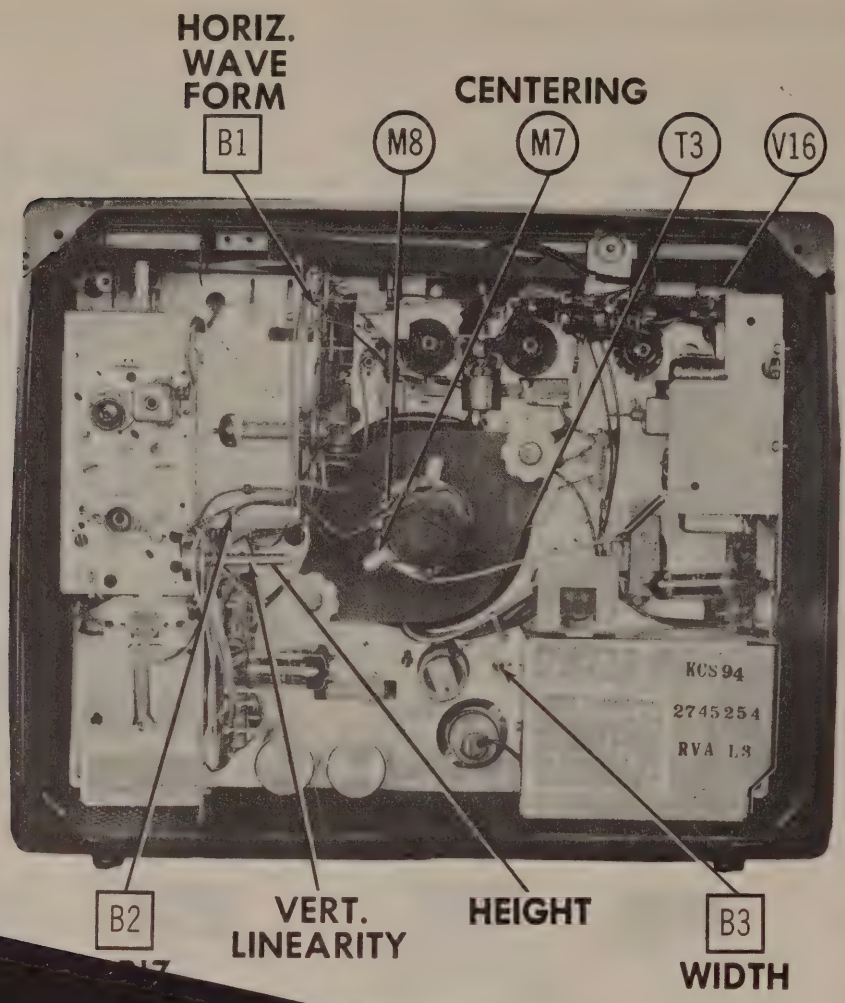
† MEASURED FROM OUTPUT OF M2.
▲ MEASURED FROM PIN 7 OF V4.
▲ MEASURED FROM PIN 3 OF V14.
NC-NO CONNECTION.
TP-TIE POINT.



TUBE PLACEMENT CHART



ORIZ. OSCILLATOR SUB-CHASSIS



HORIZONTAL SW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

CHECK OF HORIZONTAL HOLD ADJUSTMENT

1. Turn the horizontal hold control fully clockwise. Approximately 12 diagonal bars should be sloping downward to the left. Turn the horizontal hold control slowly counter clockwise until 1½ to 3 diagonal bars are present on the screen. The picture should pull in sync upon slight additional rotation of the horizontal hold adjustment and remain in sync for approximately an additional two turns in a counter clockwise direction. Further counter clockwise rotation should cause picture to lose sync with 2 to 5 diagonal bars present before motorboating occurs. Interrupted oscillation (motorboating) should occur before maximum counter clockwise rotation of the horizontal hold adjustment is reached.

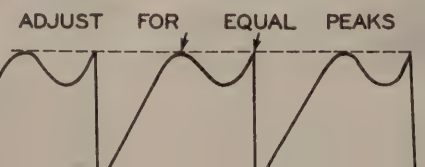
2. If the receiver does not pass the above check, turn the horizontal width slug (B3) maximum counter clockwise. Adjust the horizontal drive trimmer (B2) counter clockwise for a bright vertical line near center of screen, then turn clockwise until line disappears. Set brightness control for maximum brightness and adjust B3 for a picture slightly wider than necessary to fill the picture mask horizontally. Adjust the horizontal waveform slug (B1) until 3 or 4 bars are present before motorboating occurs when the horizontal hold adjustment is turned counter clockwise from the point at which picture loses sync.

3. If the pict… properly adjusted, it w… outlined under "horizontal hold a… Note: AGC control used in UHF/VHF Mode…

HORIZONTAL HOLD AND WAVEFORM ALIGNMENT

The horizontal waveform adjustment is adjusted at the factory and normally will require no readjustment. If the horizontal hold coil (L54) or the horizontal waveform coil (L55) are replaced in set, scope adjustment will be necessary to synchronize the picture.

Short out (L55) with a clip lead and turn the horizontal hold slug all the way out. Rotate horizontal hold slug back in coil until picture locks in sync. Remove short from (L55). Connect the low capacity probe of an oscilloscope to terminal point (L) on schematic. Low side of scope to chassis. Adjust the horizontal waveform slug (B1) until the waveform on scope appears similar to Fig. 10. If necessary, during adjustment of B1, keep picture in sync with the horizontal hold. Remove the oscilloscope.
The sync action should now be as outlined in paragraphs 1 and 2 of "Check of Horizontal Hold Adjustment". If necessary, readjust the horizontal drive trimmer and horizontal width slug as in paragraph 2 of "Check of Horizontal Hold Adjustment."



SENTINEL MODEL 1U-365

TRADE NAME	Sentinel Model 1U-365
MANUFACTURER	Sentinel Radio Corp., 2100 W. Dempster, Evanston, Ill.
TYPE SET	AC Operated AM Superheterodyne Receiver With Electric Clock
TUBES (Five)	Types 12BE6 Converter, 12BA6 IF Amp., 12AV6 Det.-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles — RATING .26 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535KC-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.02MFD	High side to antenna lug on tuning gang. Low side to B-.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	"	"	1620KC	"	"	A4	"
3.		Loop	1400KC	Tune to 1400KC signal	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

SENTINEL MODEL 1U-365

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	REPLACEMENT DATA		NOTES
		SENTINEL PART No.	STANDARD REPLACEMENT	
V1	Converter	12BE6	12BE6	
V2	IF Amplifier	12BA6	12BA6	
V3	Det.-AVC-AF Amplifier	12AV6	12AV6	
V4	Output	50C5	50C5	
V5	Rectifier	35W4	35W4	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	SENTINEL PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	50	150	25E24	PRS150V5050	BBRD5515	TCD49	TDL-D50-150	MTD-1550	TVA-2453
B	50	150							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

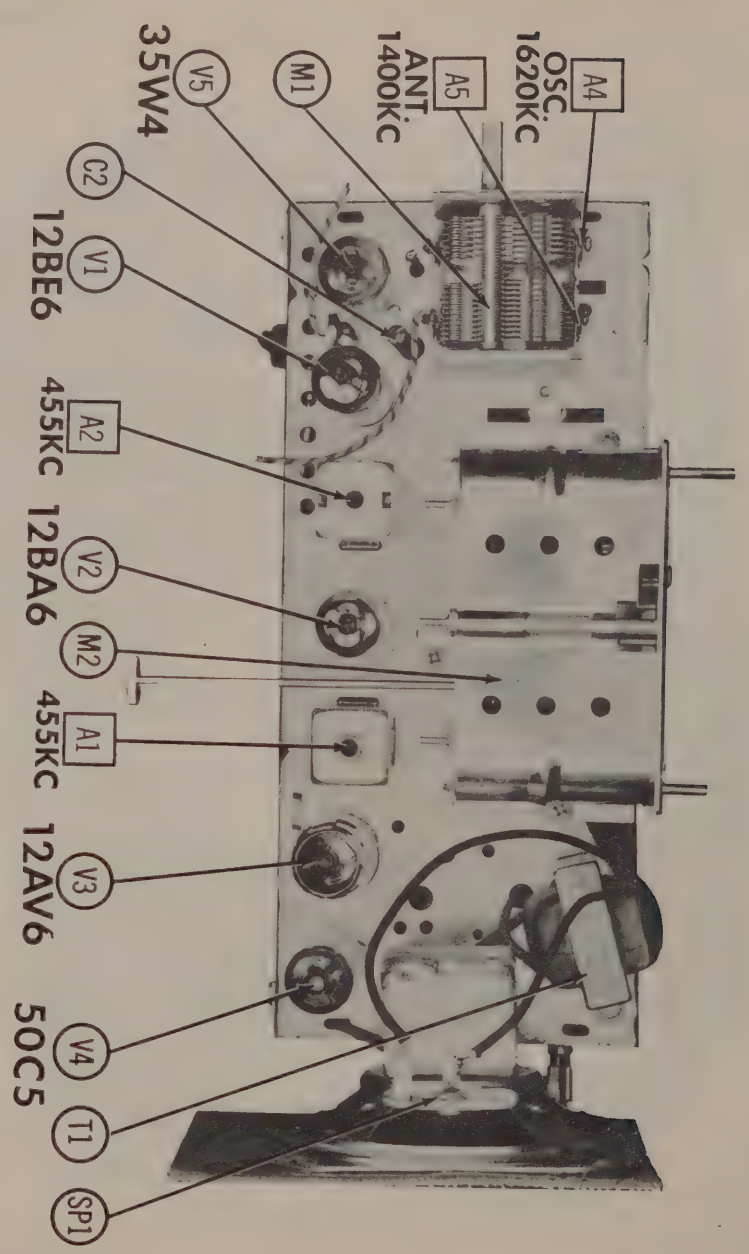
ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	SENTINEL PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	200		23E4000-29	SI200	D6-201		GP2K-201	UC-532	5GA-T2	
C3	.047	200	23E3214	BPD-05	DF-503	CUB2S47		PT4147	2TM-S47	
C4	30		†23E2022-4		TCZ-30	TZ17	NP0L-300			
C5A	220									
B	5000									
C	5000		♦23E2041-6	♦PA-113-1	♦PC-151	♦116TM2	♦1408-02			
D	250								♦DT-2	
E										
C6	10000		23E4004-17	BPD-01	DD-103	K082	811-01			
C7	.047	400	23E3414	BPD-05	DF-503	CUB4S47		DC-511	5HK-S1	
C8	.1	400	23E3416	P488N-1	DF-104	CUB4P1		PT4147	4TM-S47	
								PT401	4TM-P1	

† Items C4 and R3 are combined in one unit.
♦ Items C5A, C5B, C5C, C5D, C5E, R7A, R7B and R7C are combined in one unit. When replacing items separately C5D and C5E should total 250MMF.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	SENTINEL PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500KΩ	½	28E106	AB-60	A47-500K-Z	Q13-133	U-48	Volume
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R1A

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	SENTINEL PART No.	IRC PART No.	
R2	1Meg	$\frac{1}{2}$	27E105M-$\frac{1}{2}$	BTS-1Meg	
R3	22KΩ	$\frac{1}{2}$	†23E2022-4	BTS-22K	
R4	3.3Meg	$\frac{1}{2}$	27E335M-$\frac{1}{2}$	BTS-3.3Meg	
R5	68Ω	$\frac{1}{2}$	27E680K-$\frac{1}{2}$	BTS-68	
R6	47KΩ	$\frac{1}{2}$	27E473K-$\frac{1}{2}$	BTS-47K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	SENTINEL PART No.	IRC PART No.	
R7A	6.8Meg		♦23E2041-6	BTS-6.8Meg	
B	470KΩ			BTS-470K	
C	470KΩ			BTS-470K	
R8	150Ω	$\frac{1}{2}$	27E151K-$\frac{1}{2}$	BTS-150	
R9	1200Ω	1	27E122K-1	BTA-1200	
R10	33Ω	1	27E330K-1	BTA-33	

† Items R3, C4 are combined in one unit.
♦ Items R7A, R7B, R7C, C5A, C5B, C5C, C5D, and C5E are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	SENTINEL PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2.7KΩ	3Ω	22E88	Z1101	A3025	A3332	26S58	S-12X	

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	SENTINEL PART No.	QUAM PART No.	RCA TYPE No.	
SP1	3½"	PM	3Ω	1E56	3A07		

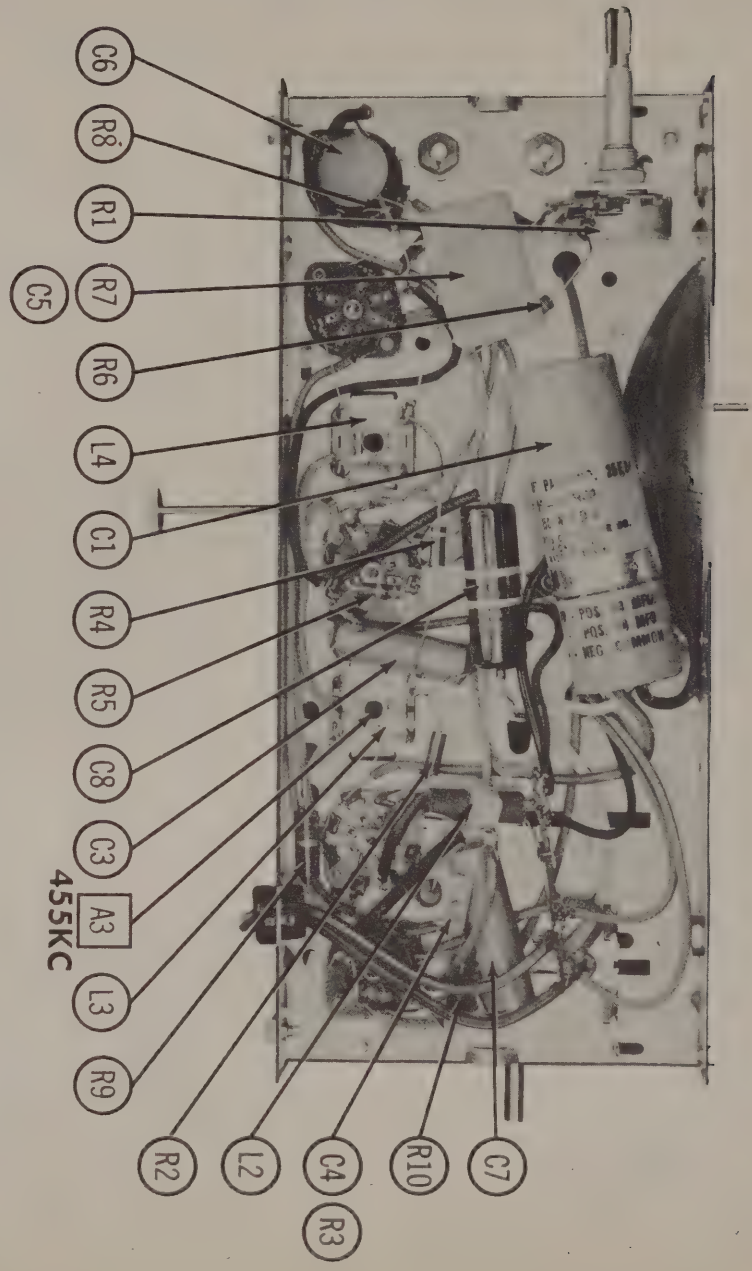
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	SENTINEL PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	3.7Ω		20E1025				Includes cabinet back
L2	Osc. Coil	1.1Ω	10Ω	20E938	14-1074	BC-394	70-OSC	
L3	Input IF	14Ω	14Ω	20E732	16-6758	BC-352	12-C1	
L4	Output IF	17Ω	17Ω	20E997	16-6758	BC-353	12-C2	

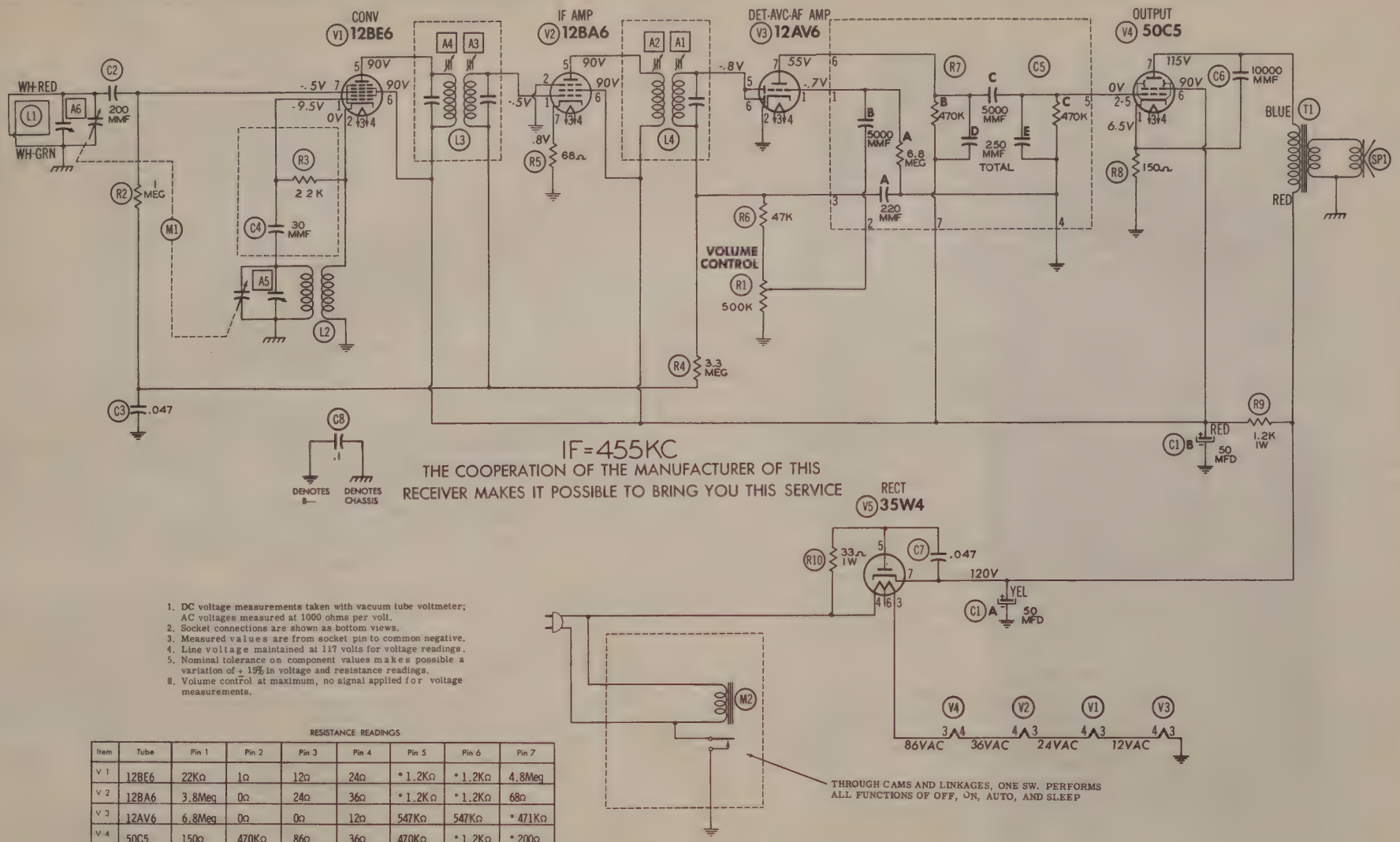
MISCELLANEOUS

ITEM No.	PART NAME	SENTINEL PART No.	NOTES
M1	Tuning Cap.	24E64-2	2 Gang (14-315MMF, 13-105MMF)
M2	Clock	61E22	
	Cabinet	7E468	Green
	Cabinet	7E468-2	Tan
	Cabinet	7E468-3	Ivory
	Cabinet	7E468-4	Mahogany
	Cabinet	7E468-5	Red
	Cabinet	7E468-6	Rust
	Cabinet	7E468-7	Yellow
	Cabinet	7E468-8	Gray
	Knob	35E37-24	Station selector - green
	Knob	35E37-25	Station selector - tan
	Knob	35E37	Station selector - ivory
	Knob	35E37-3	Station selector - mahogany
	Knob	35E37-9	Station selector - red
	Knob	35E37-6	Station selector - rust
	Knob	35E37-22	Station selector - yellow
	Knob	35E37-23	Station selector - gray
	Knob	37E47-20	Volume - green
	Knob	37E47-21	Volume - tan
	Knob	37E47-13	Volume - ivory
	Knob	37E47-12	Volume - mahogany
	Knob	37E47-14	Volume - red
	Knob	37E47-17	Volume - rust
	Knob	37E47-27	Volume - yellow
	Knob	37E47-28	Volume - gray
	Knob	37E80-11	Clock
	Crystal	9E52	Clock

CHASSIS—BOTTOM VIEW



SENTINEL MODEL IU-365



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	1Ω	12Ω	24Ω	*1.2KΩ	*1.2KΩ	4.8Meg
V 2	12BA6	3.8Meg	0Ω	24Ω	36Ω	*1.2KΩ	*1.2KΩ	68Ω
V 3	12AV6	6.8Meg	0Ω	0Ω	12Ω	547KΩ	547KΩ	*471KΩ
V 4	50C5	150Ω	470KΩ	86Ω	36Ω	470KΩ	*1.2KΩ	*200Ω
V 5	35W4	NC	TP	86Ω	121Ω	154Ω	115Ω	50KΩ

* MEASURED FROM PIN 7 OF V5.
NC-NO CONNECTION.
TP-TIE POINT.

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*TRADE MARK

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SENTINEL MODELS 1U-1101, 1U-1111, 1U-1121, 1U-1124, 1U-1126, 1U-1127, 1U-1131, 1U-1134, 1U-1136, 1U-1137, 1U-1145, 1U-1147, 1U-1155, 1U-1157, 21101, 21121, 21145

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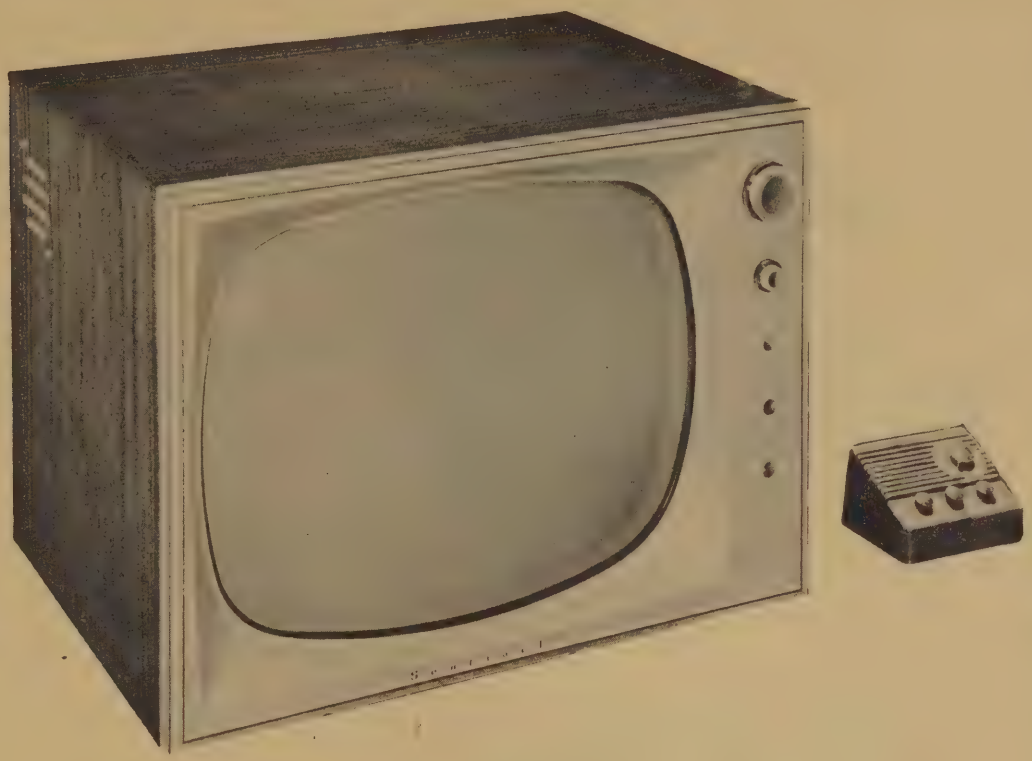

SENTINEL MODEL 21121

TRADE NAME	Sentinel	MODELS 1U-1101, 1U-1111, 1U-1121, 1U-1124, 1U-1126, 1U-1127, 1U-1131, 1U-1134, 1U-1136, 1U-1137, 1U-1145, 1U-1147, 1U-1155, 1U-1157, 1U-1161, 1U-1164, 1U-1165, 1U-1171, 1U-1174, 1U-1175, 1U-2116l, 1U-2116l, 1U-2116l, 21101, 21121, 21145
MANUFACTURER	Sentinel Radio Corp., 2100 W. Dampster St., Evanston, Illinois	
TYPE SET	Television Receiver	
TUBES	Sixteen	
POWER SUPPLY	110-120 Volts AC-60 Cycles	RATING 1.22 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)	

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SENTINEL MODELS 1U-1101, 1U-1111, 1U-1121, 1U-1124, 1U-1126, 1U-1127, 1U-1131, 1U-1134, 1U-1136, 1U-1137, 1U-1145, 1U-1147, 1U-1155, 1U-1157, 21101, 21121, 21145

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3924 MEADE ST.
DENVER, COLORADO

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DATE 5-56 SET 315 FOLDER 11

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DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 7 push-on type control knobs from front panel of cabinet.
2. Remove 6 metal screws. Remove rear cover.
3. Remove 2 metal screws from antenna terminal bracket.
4. Disconnect speaker leads, yoke leads, picture tube socket and H. V. lead.
5. Remove 2 chassis bolts. Slide chassis out of guides at the top of cabinet.
6. Remove 2 speaker nuts. Remove speaker.

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MODELS

1U-1101, 1U-1111, 1U-1121, 1U-1124, 1U-1126, 1U-1127, 1U-1131, 1U-1134, 1U-1136, 1U-1137, 1U-1145, 1U-1147, 1U-1155, 1U-1157, 1U-1161, 1U-1164, 1U-1165, 1U-1171, 1U-1174, 1U-1175, 1U-21161, 1U-21164, 1U-21165, 21101, 21121, 21145

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, thru the small hole in the cabinet above and slightly to the left of the channel selector shaft.

PICTURE TUBE SAFETY GLASS CLEANING

For picture tube safety glass cleaning, it is necessary to remove chassis. (See disassembly instructions).

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 5.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Turn the set on and tune in a TV station. Turn the horizontal hold control until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, it is necessary to remove the rear cover and supply power to the set. Adjust the buzz control (R9) for maximum volume and minimum buzz.

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

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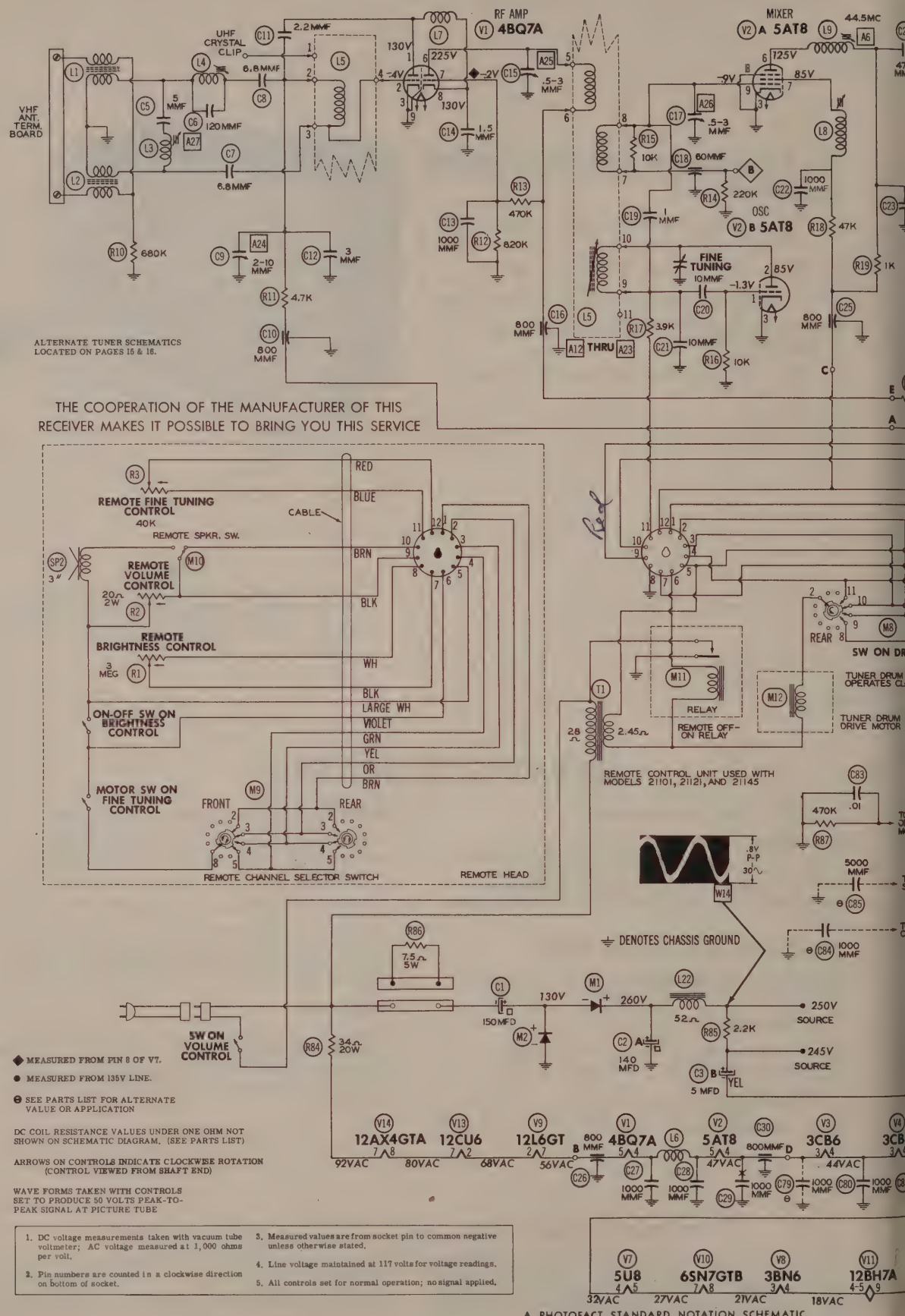
G290

DATE 5-56 SET 315 FOLDER 11


RF AMP V1 4BQ7A
MIXER V2A 5AT8
OSC V2B 5AT8
UHF CRYSTAL CLIP
VHF ANT. TERM. BOARD
FINE TUNING
THRU
ALTERNATE TUNER SCHEMATICS LOCATED ON PAGES 15 & 16.
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
REMOTE FINE TUNING CONTROL 40K
REMOTE SPKR. SW.
REMOTE VOLUME CONTROL 20Ω 2W
REMOTE BRIGHTNESS CONTROL 3 MEG
ON-OFF SW ON BRIGHTNESS CONTROL
MOTOR SW ON FINE TUNING CONTROL
CABLE
RED
BLUE
BRN
BLK
WH
BLK
LARGE WH
VIOLET
GRN
YEL
OR
BRN
FRONT
REAR
REMOTE CHANNEL SELECTOR SWITCH
REMOTE HEAD
REMOTE CONTROL UNIT USED WITH MODELS 21101, 21121, AND 21145
RELAY
REMOTE OFF-ON RELAY
TUNER DRUM OPERATES CL
TUNER DRUM DRIVE MOTOR
SW ON DR
SW ON VOLUME CONTROL
DENOTES CHASSIS GROUND
130V
260V
250V SOURCE
245V SOURCE
150 MFD
140 MFD
5 MFD
12AX4GTA V14
12CU6 V13
12L6GT V9
4BQ7A V1
5AT8 V2
3CB6 V3
5U8 V7
6SN7GTB V10
3BN6 V8
12BH7A V11
92VAC
80VAC
68VAC
56VAC
47VAC
44VAC
32VAC
27VAC
21VAC
18VAC
◆ MEASURED FROM PIN 8 OF V7.
● MEASURED FROM 135V LINE.
⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM. (SEE PARTS LIST)
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltage measured at 1,000 ohms per volt.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation; no signal applied.
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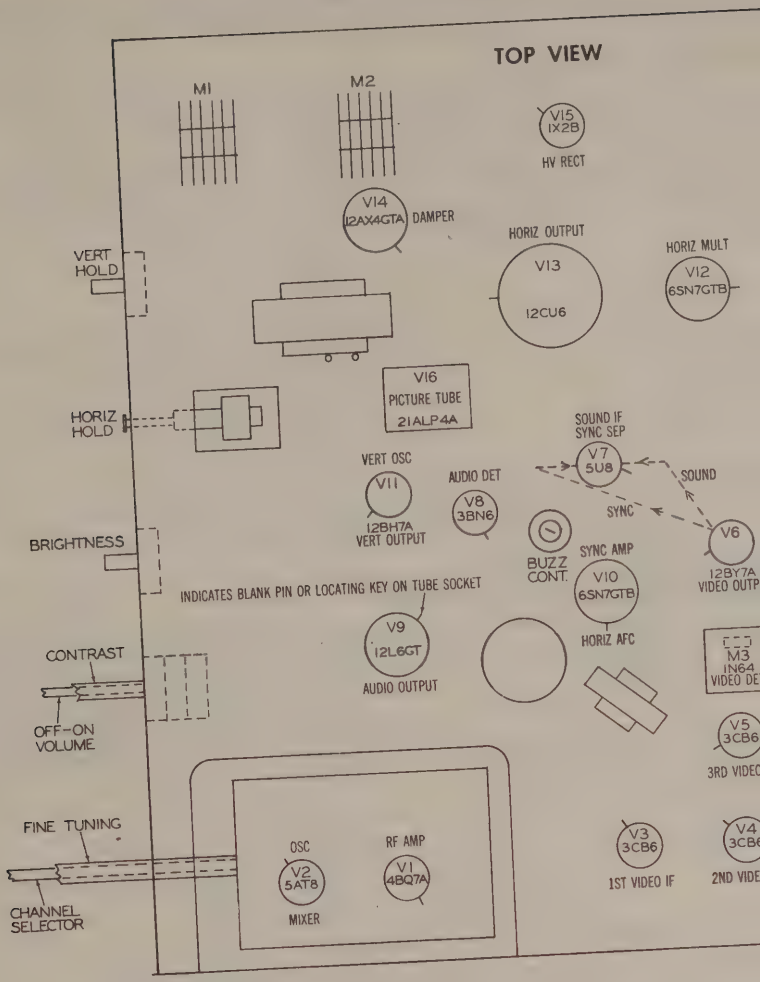
CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

R66
R77
R74
R72
R76
R73
R78
R48
R49
R75
R71
RED
YELLOW



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicat
Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **Selenium Rectifiers (M1 & M2)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V6, V9**
No pic, no sound, has snow -**V1, V2, V3**
No pic, has sound, has raster - **V6, V16**

	FREQUENCY	FREQUENCY				
ground- ating be (V2). is.	44MC (10MC Swp.)	41.25MC 42.75MC 45.75MC 47.25MC	3	Vert. Amp. thru 47KΩ to point (A). Low side to chassis.		Check for response curve similar to If necessary, SLIGHTLY retouch A1, A4, A6 and A7 to obtain desired res To view 41.25 and 47.25MC markers, rarily remove bias battery and increase gain and marker generator output. should fall in trap notches as in Fig.

4.5MC TRAP ALIGNMENT

aximum.
n 1 of 3CB6/ V5 to ground.

	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
2 of side to	4.5MC Unmod.	Any	DC probe thru crystal diode to pin 11 of picture tube. Common to chassis.	A8	Adjust for MINIMUM reading. Remove short fr

SOUND IF ALIGNMENT USING ON THE AIR SIGNAL

a strong TV signal. Turn the buzz control (R9) 90° from maximum clockwise rotation. Adjust A9 for e signal strength. (Remove the antenna from antenna strip and stray feed the signal by placing the antenna inals). Adjust A10 and A11 for maximum volume. Adjust R9 for minimum noise. Reconnect antenna and volume. If necessary, reduce volume so this peak can be heard.

ALTERNATE SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
level.

R	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
(grid) ow	4.5MC (400∿ Mod.) (50KC Swp.)	4.5MC	Any non-interfering channel	Across secondary of T6.	A9	Set buzz control (R9) 90° from maxi clockwise rotation. Adjust A8 for m 400∿ indication scope.
	"	"	"	"	A11, A10	Attenuate generator output so that si below the limiting level of the 3BN6 denced by background hiss and noise. A11 and A10 for maximum 400∿ respo scope.
	"	4.5MC (400∿ Mod.)	"	"	R9	Use a high generator output and adju MINIMUM 400∿ indication on scope.
	"	4.5MC	"	"	A9	With volume control at low level, re for maximum 400∿ indication on sco

ALIGNMENT INSTRUCTIONS (cont)

OSCILLATOR ALIGNMENT FOR ALL TUNERS

Leave bias connected as under "Video IF Alignment".
Restore tube shield on converter tube (V2) to its normal position. The channel oscillator adjustment screws are reached through a hole to the left and just below the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
15.	Two 120Ω Carbon Resistors	Across antenna terminal with 120Ω in each lead.	213MC (10MC Swp.)	211. 25MC 215. 75MC	13	Vert. Amp. thru 47KΩ to point (A). Low side to chassis.	A12	Adjust to place sound marker in sound trap as in Fig. 2. Video marker should fall at 55%.
			207MC (10MC Swp.)	205. 25MC 209. 75MC	12		A13	
			201MC (10MC Swp.)	199. 25MC 203. 75MC	11		A14	
			195MC (10MC Swp.)	193. 25MC 197. 75MC	10		A15	
			189MC (10MC Swp.)	187. 25MC 191. 75MC	9		A16	
			183MC (10MC Swp.)	181. 25MC 185. 75MC	8		A17	
			177MC (10MC Swp.)	175. 25MC 179. 75MC	7		A18	
			85MC (10MC Swp.)	83. 25MC 87. 75MC	6		A19	
			79MC (10MC Swp.)	77. 25MC 81. 75MC	5		A20	
			69MC (10MC Swp.)	67. 25MC 71. 75MC	4		A21	
			63MC (10MC Swp.)	61. 25MC 65. 75MC	3		A22	
			57MC (10MC Swp.)	55. 25MC 59. 75MC	2		A23	

VHF RF AND MIXER ALIGNMENT FOR ALL TUNERS

Set the locality switch to the "strong" position.,
Leave the bias battery connected as under "Video IF Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
16.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp.)	205. 25MC 209. 75MC	12	Vert. Amp. thru 10KΩ to point (B). Low side to chassis.	A24, A25, A26	Adjust for response curve similar to Fig. 3 with markers above 90%.
17.	"	"	213MC (10MC Swp.)	211. 25MC 215. 75MC	13	"		Check for response similar to Fig. 3. If markers fall below 70% on any channel, make compromise adjustments of A24, A25, and A26 with channel switch set to that channel. Check all other channels to see that they have not been seriously affected.
			201MC (10MC Swp.)	199. 25MC 203. 75MC	11			
			195MC (10MC Swp.)	193. 25MC 197. 75MC	10			
			189MC (10MC Swp.)	187. 25MC 191. 75MC	9			
			183MC (10MC Swp.)	181. 25MC 185. 75MC	8			
			177MC (10MC Swp.)	175. 25MC 179. 75MC	7			
			85MC (10MC Swp.)	83. 25MC 87. 75MC	6			
			79MC (10MC Swp.)	77. 25MC 81. 75MC	5			
			69MC (10MC Swp.)	67. 25MC 71. 75MC	4			
			63MC (10MC Swp.)	61. 25MC 65. 75MC	3			
			57MC (10MC Swp.)	55. 25MC 59. 75MC	2			

40MC TRAP ALIGNMENT

The 40MC trap (A27) will require adjustment only where a local interfering signal from 40MC thru 45MC affects the picture. In such cases A27 should be adjusted for minimum 40MC beat interference in the picture.

UHF TUNER ALIGNMENT

The UHF portion of this receiver has been properly aligned at the factory and is very stable. Alignment of the UHF portion of this receiver is not recommended in the field.

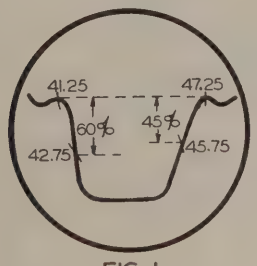


FIG. 1

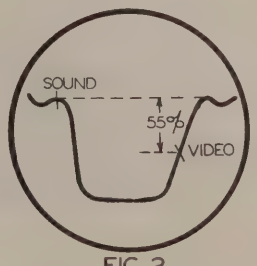


FIG. 2

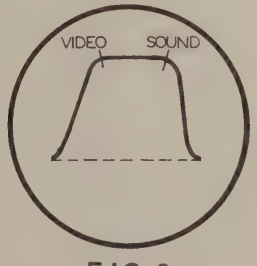


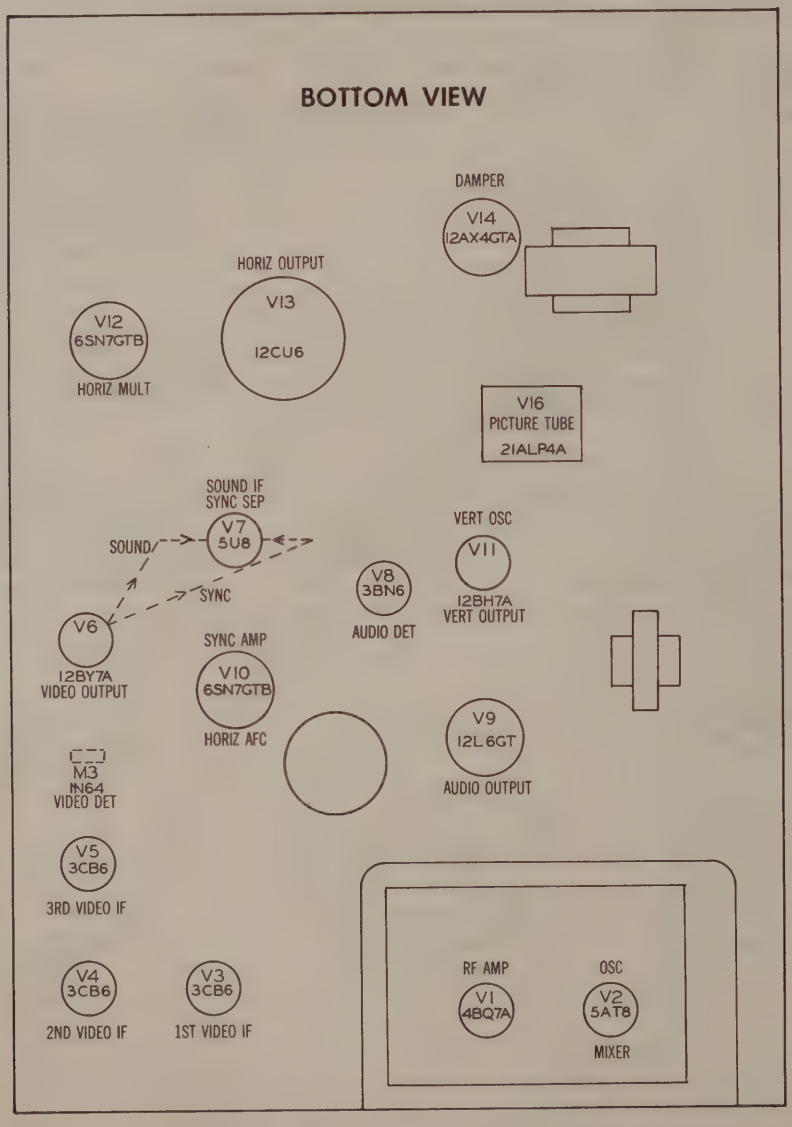
FIG. 3

SENTINEL MODELS 1U-1101, 1U-1111, 1U-1121, 1U-1124, 1U-1126, 1U-1127, 1U-1131, 1U-1134, 1U-1136, 1U-1137, 1U-1145, 1U-1147, 1U-1155, 1U-1157, 21101, 21121, 21145

RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	4BQ7A	INF	4Meg	0Ω	12Ω	13Ω	† 1.5KΩ	300KΩ	INF	0Ω
V 2	5AT8	10KΩ	■ 5.4KΩ	0Ω	11Ω	12Ω	■ 1.5KΩ	■ 47KΩ	0Ω	220KΩ
V 3	3CB6	1.5Meg	47Ω	11Ω	10Ω	■ 1KΩ	■ 1KΩ	0Ω		
V 4	3CB6	1.5Meg	47Ω	10Ω	9Ω	■ 1KΩ	■ 1KΩ	0Ω		
V 5	3CB6	.1Ω	120Ω	9Ω	8Ω	■ 1KΩ	■ 1KΩ	0Ω		
V 6	12BY7A	150Ω	470KΩ	0Ω	8Ω	8Ω	7Ω	† 4KΩ	† 18KΩ	0Ω
V 7	5U8	■ 1.5Meg	.8Ω	■ 5.6KΩ	7Ω	6Ω	■ 5.6KΩ	120Ω	0Ω	2.2Meg
V 8	3BN6	300Ω	.6Ω	5Ω	4Ω	■ 10KΩ	4.8Ω	† 300KΩ		
V 9	12L6GT	NC	16Ω	† 270Ω	† 52Ω	250KΩ	TP	13Ω	150KΩ	
V 10	6SN7GTB	22KΩ	■ 10KΩ	2.2KΩ	350KΩ	33KΩ	100KΩ	6Ω	5Ω	
V 11	12BH7A	▲ 2.5Meg	450KΩ	210Ω	4Ω	4Ω	▲ 800Ω	▲ 2.5Meg	6KΩ	3Ω
V 12	6SN7GTB	5Meg	† 8KΩ	1.3KΩ	150KΩ	† 100KΩ	1.3KΩ	3Ω	1Ω	
V 13	12CU6	NC	16Ω	TP	† 18KΩ	470KΩ	TP	18Ω	0Ω	TOP CAP ▲ 14Ω
V 14	12AX4GTA	NC	NC	300KΩ	NC	† 52Ω	TP	20Ω	18Ω	
V 15	1X2B		PINS	1 - 9	HAVE	INF	RESISTANCE			TOP CAP ▲ 274Ω
V 16	21ALP4A	0Ω	16KΩ	PIN 6 ▲ 330KΩ	PIN 10 ▲ 330KΩ	PIN 11 ■ 300KΩ	PIN 12 1Ω			

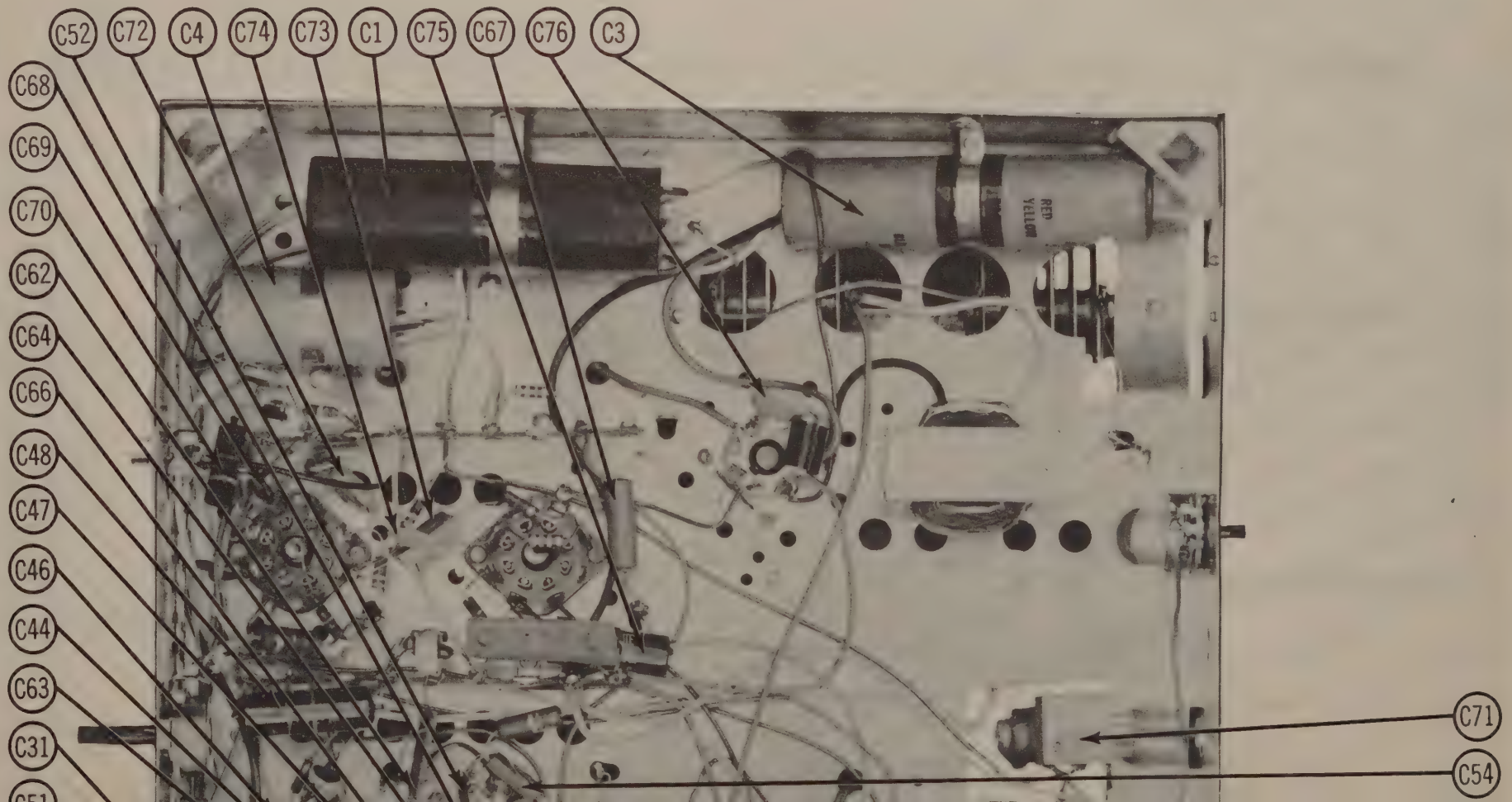
† MEASURED FROM OUTPUT OF M1.
■ MEASURED FROM 135V LINE.
▲ MEASURED FROM PIN 3 OF V14.
TP-TIE POINT.
NC-NO CONNECTION.

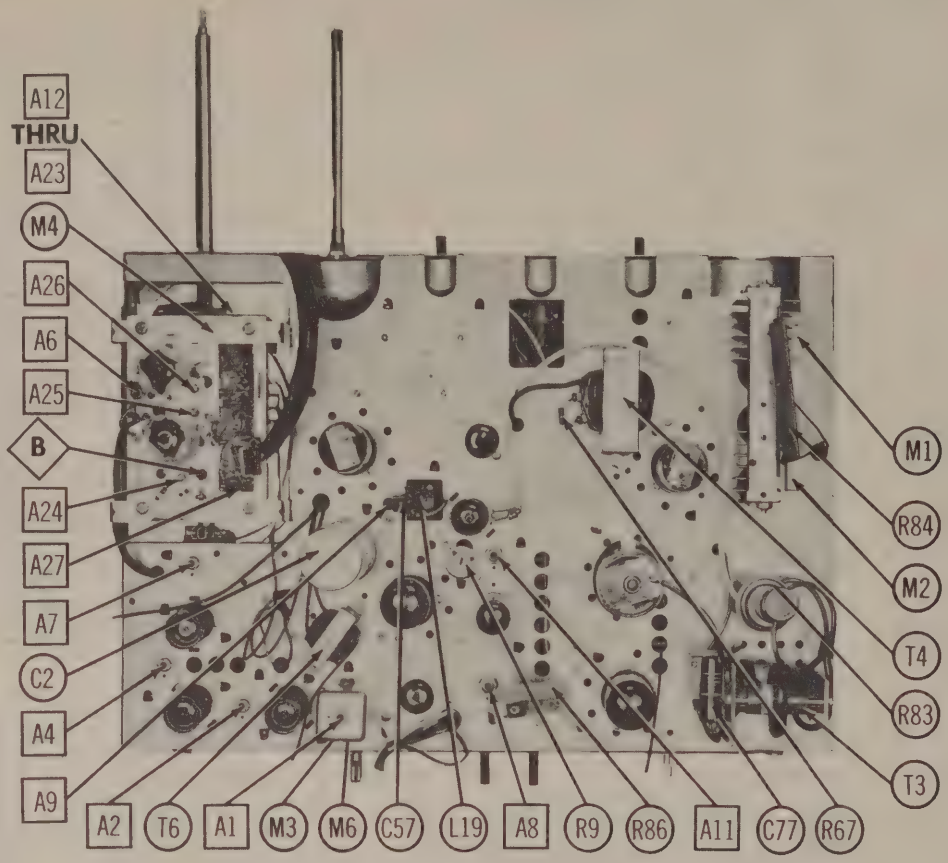


TUBE PLACEMENT CHART

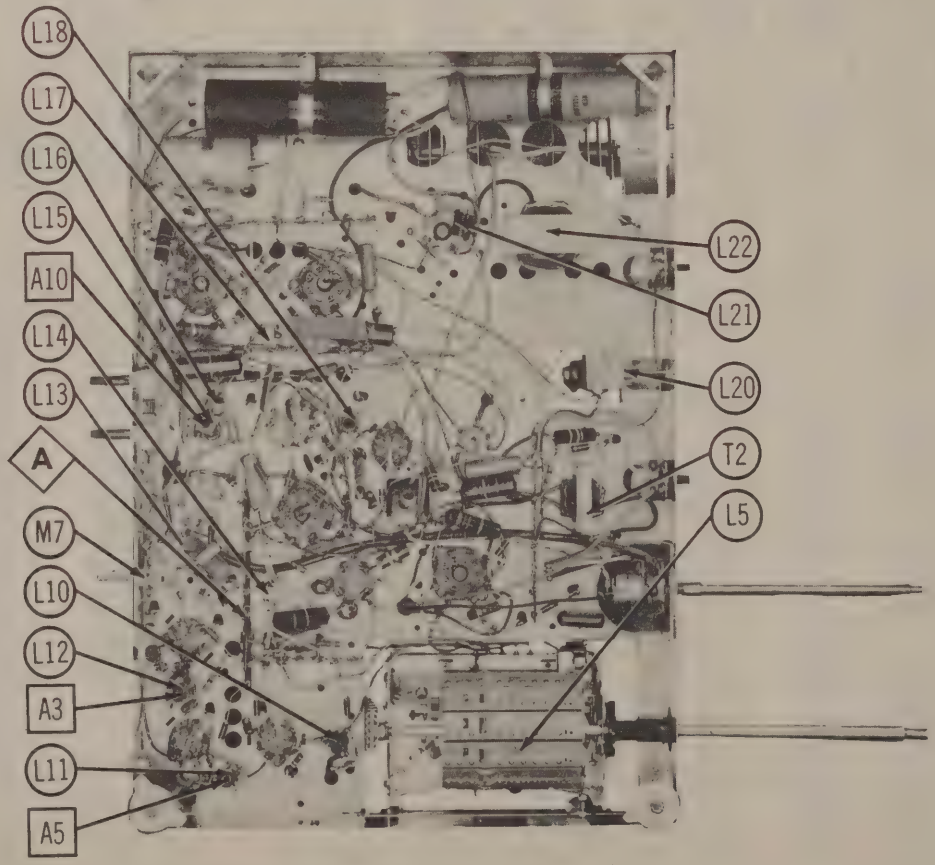
CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

SENTINEL MODELS 1U-1101, 1U-1111, 1U-1121, 1U-1124, 1U-1126, 1U-1127, 1U-1131, 1U-1134, 1U-1136, 1U-1137, 1U-1145, 1U-1147, 1U-1155, 1U-1157, 21101, 21121, 21145

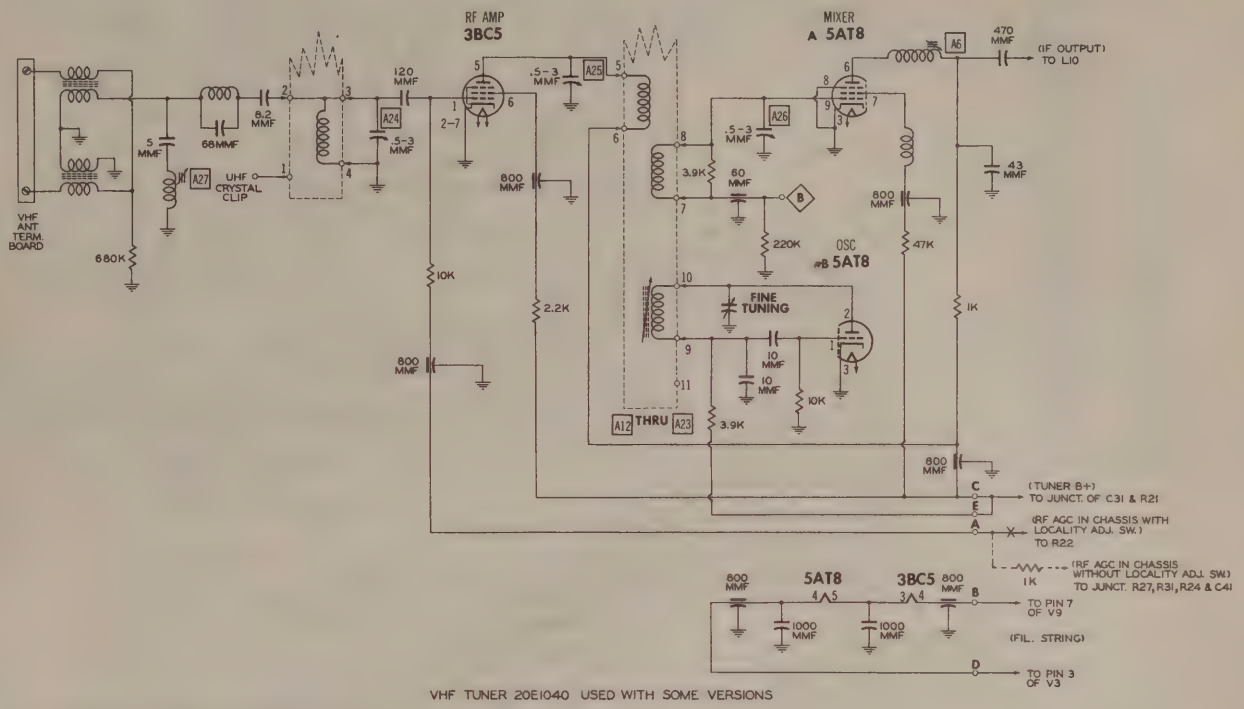

C52
C72
C4
C74
C73
C1
C75
C67
C76
C3
C68
C69
C70
C62
C64
C66
C48
C47
C46
C44
C63
C31
C51
C71
C54
RED
YELLOW



CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

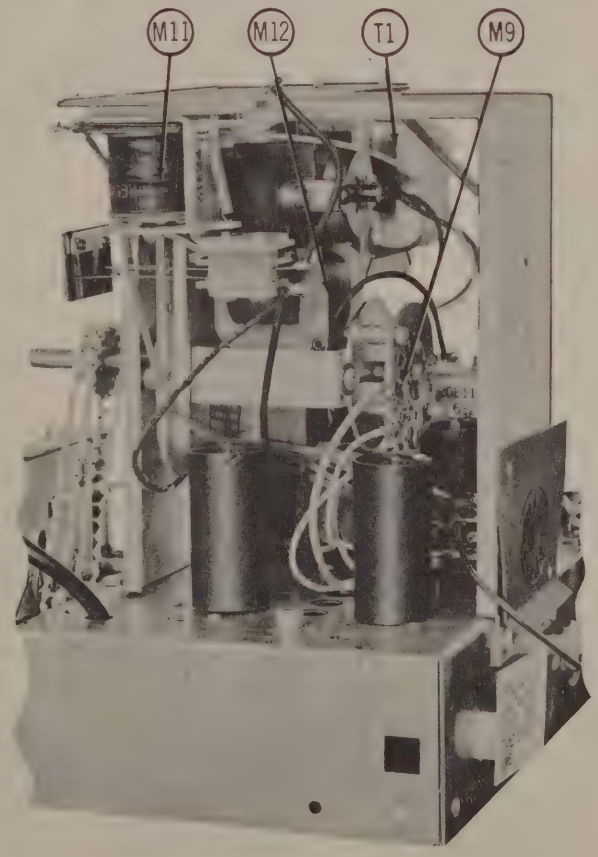


VHF TUNER 20E1040 USED WITH SOME VERSIONS

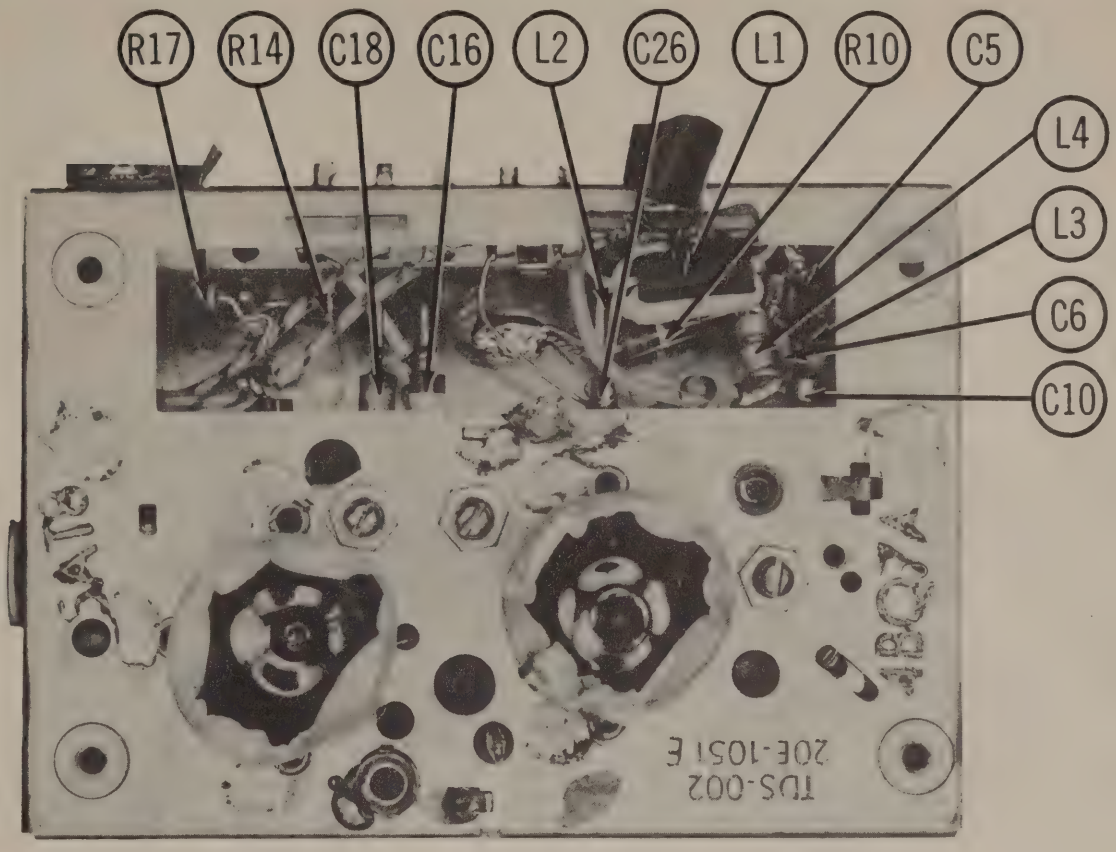
A PHOTOFACT STANDARD NOTATION SCHEMATIC

© Howard W. Sams & Co., Inc. 1956

ALTERNATE VHF TUNER SCHEMATIC

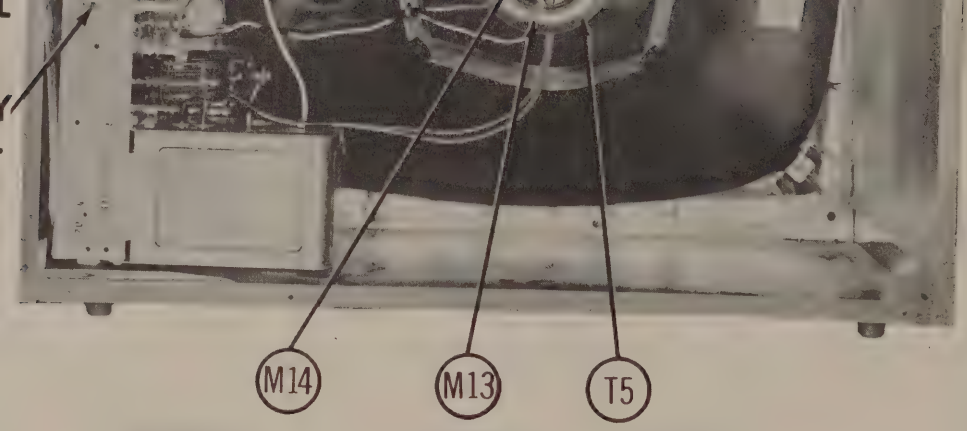


MOTOR & RELAY UNIT



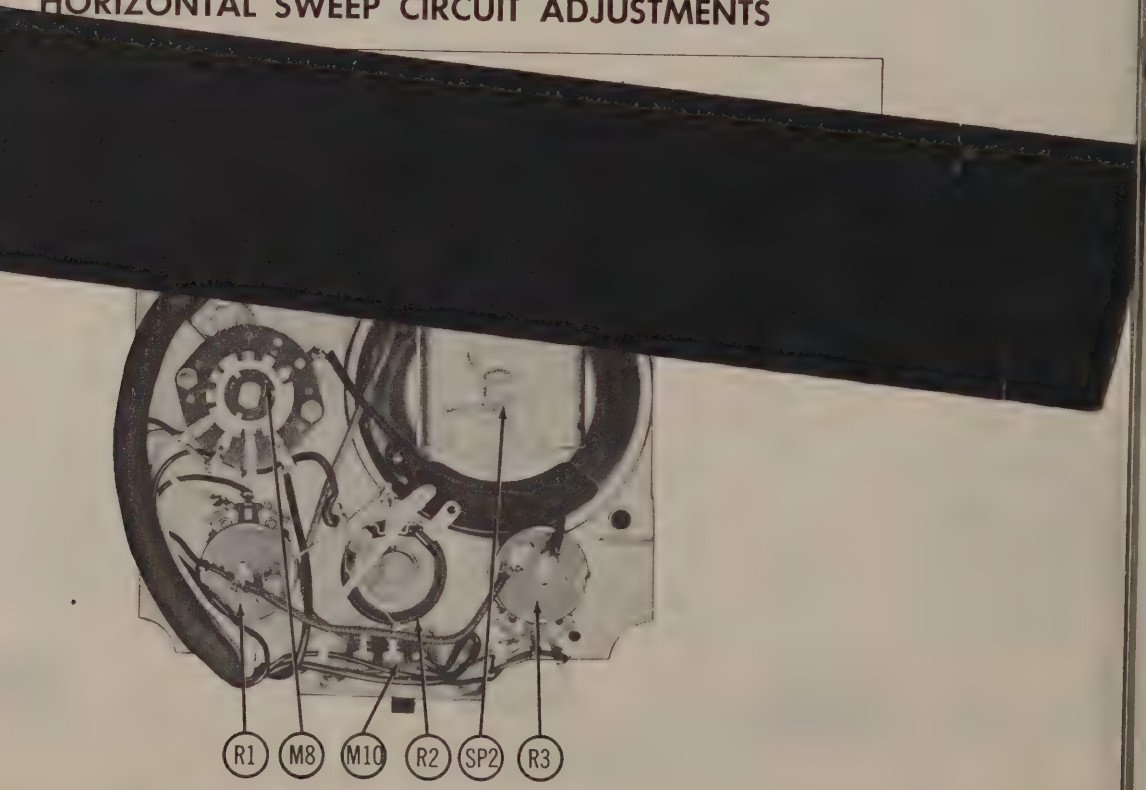
RF TUNER-TOP VIEW

RF TUNER-BOTTOM VIEW



CABINET—REAR VIEW

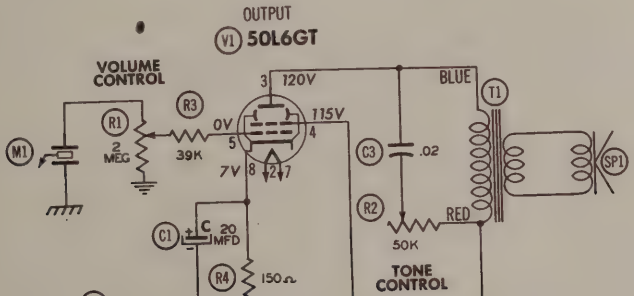
HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS



REMOTE CONTROL UNIT

TRADE NAME	Silvertone Model 5245 (Ch. 137.92000, 137.92001, 137.92002, 137.92003)
SUPPLIER	Sears Roebuck & Co., 925 S. Homan, Chicago, Ill.
TYPE SET	AC Operated Phono Amplifier with 3 Speed Manual Record Player
TUBES (Two)	Types 50L6GT (or) 50C5 Output, 35Z5GT (or) 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles

RATING .41 Amp. @ 11



2TM-S2	

STALLATION NOTES
ne & switch

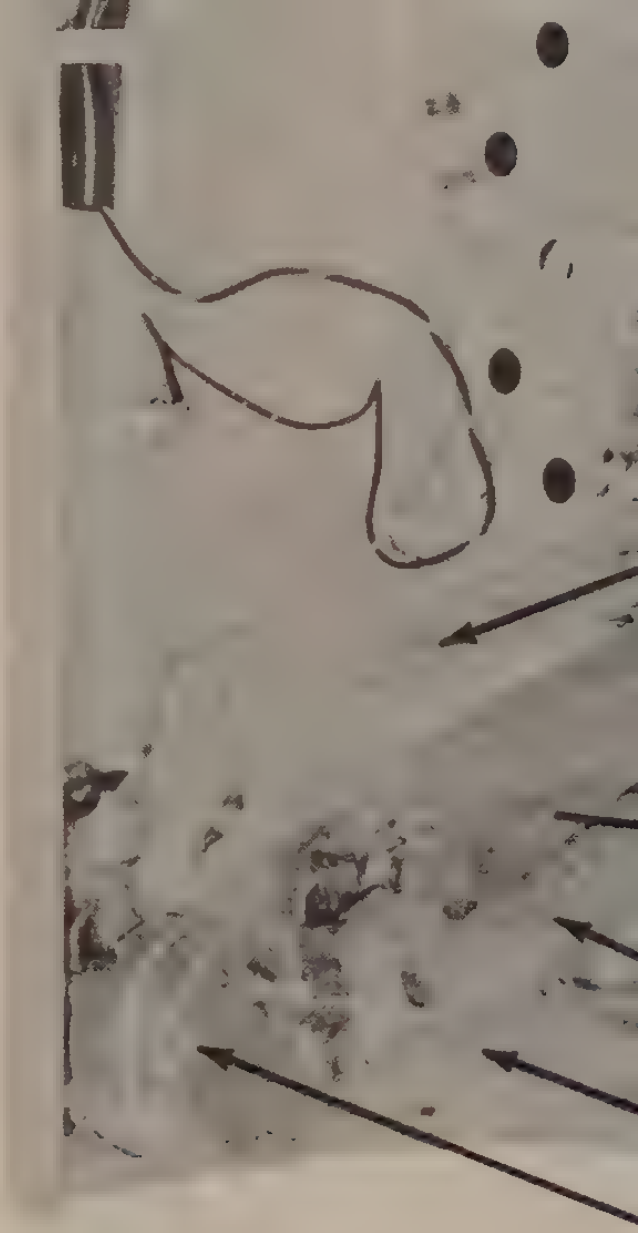
ENT DATA	
IRC PART No.	NOTES
BTB-39	

NOTES

OTES

ssembly.

ARKS



MISCEL

ITEM No.	PART NAME	SILVERTONE PART No.	
M3	Phono Motor	C11515	Cha
	Phono Motor	C11474	Cha
	Cabinet	C5245	
	Handle	C10506	
	Knob	C11486	Con

of PHOTOFACTS assembled in a DELUXE BINDER.

Merely insert the corresponding folder on this model in retain proper filing and indexing order.

2. Remove 2 metal screws located behind the picture and channel selector knobs.

3. Remove 12 wood screws. Remove rear cover.

4. Place receiver face down on a soft surface.

5. Remove 2 wood screws from interlock bracket.

6. Disconnect 5 yoke leads, speaker leads, picture tube socket and HV lead.

7. Remove 4 chassis bolts. Remove chassis.

8. Remove 4 speaker nuts. Remove speaker.

MODEL

2D-1512A, 2D-1514A, 2D-

C10
800 MMF

800

C20

PERATION OF THE MANUFACTURER OF THIS
AKES IT POSSIBLE TO BRING YOU THIS SERVICE

C89 5000 MMF
470K
R89

C90 5000 MMF
470K
R90

TO PIN 7 OF V10
82K
VERT. HOLD CONTROL
150K

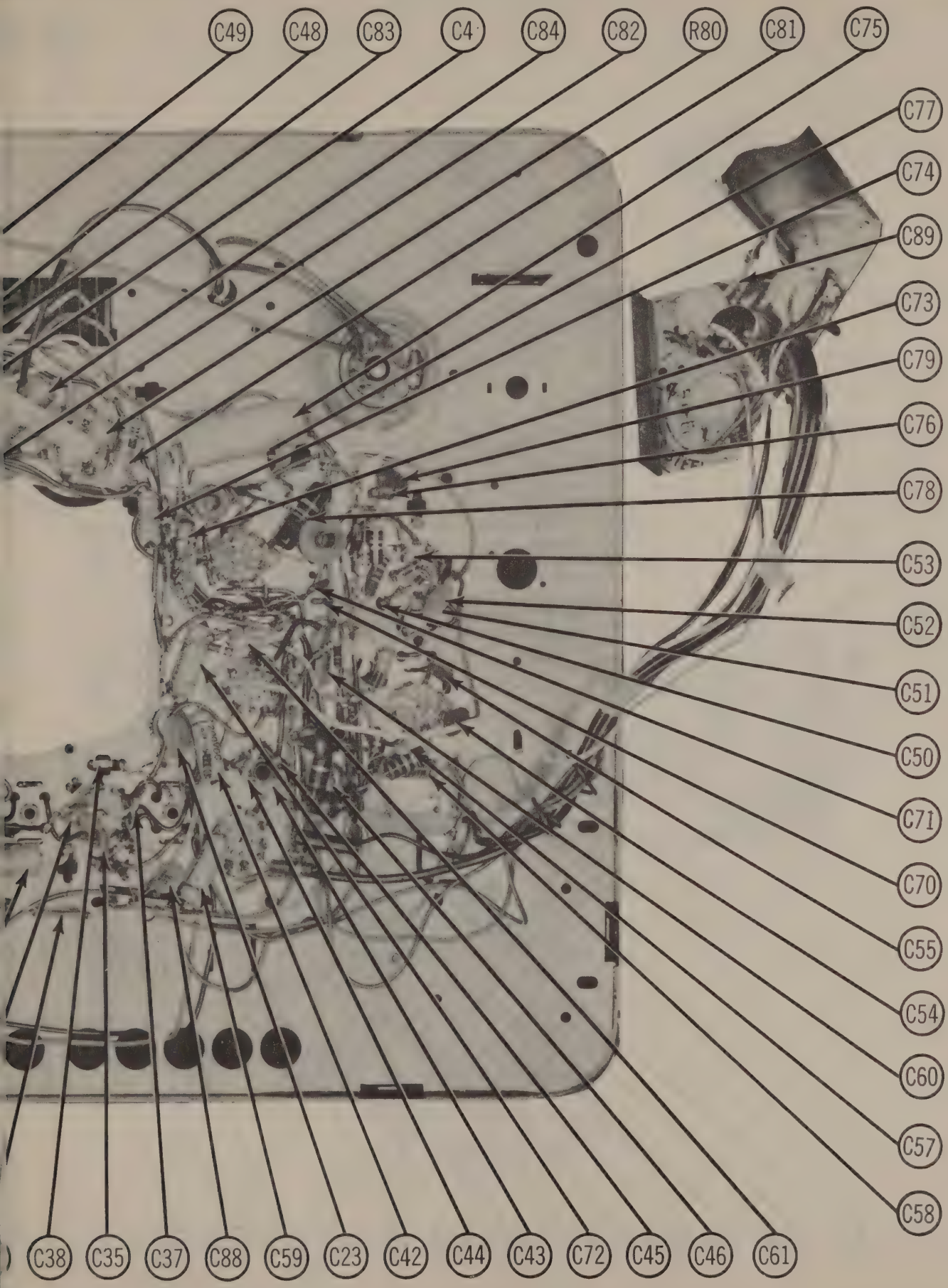
TE VERT. HOLD CONTROL
IONS USED IN SOME
S

TO JUNCT. OF R18 & C23
2.2 MEG
LOCAL
FRINGE
TO TUNER TERM. A
.1
TUNER AGC CONTROL
3 MEG

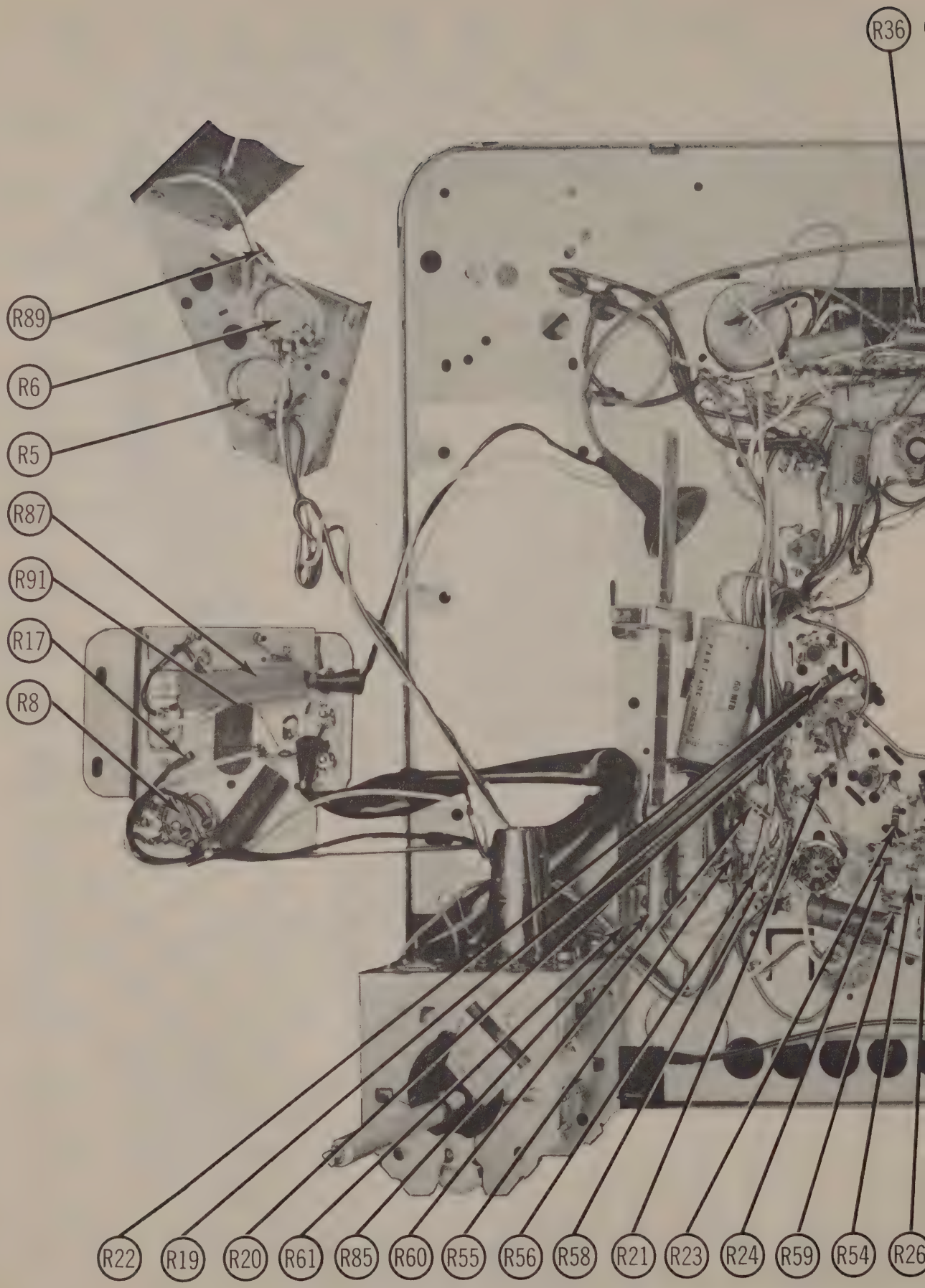
ALTERNATE TUNER AGC CONTROL CONNECTIONS USED IN SOME VERSIONS

⏚ DENOTES CHASSIS GROUND

RESET BUTTON
M4
R87
4.7Ω 15W
130V
M2
L26
45Ω
R86
2.5K 5W
RED

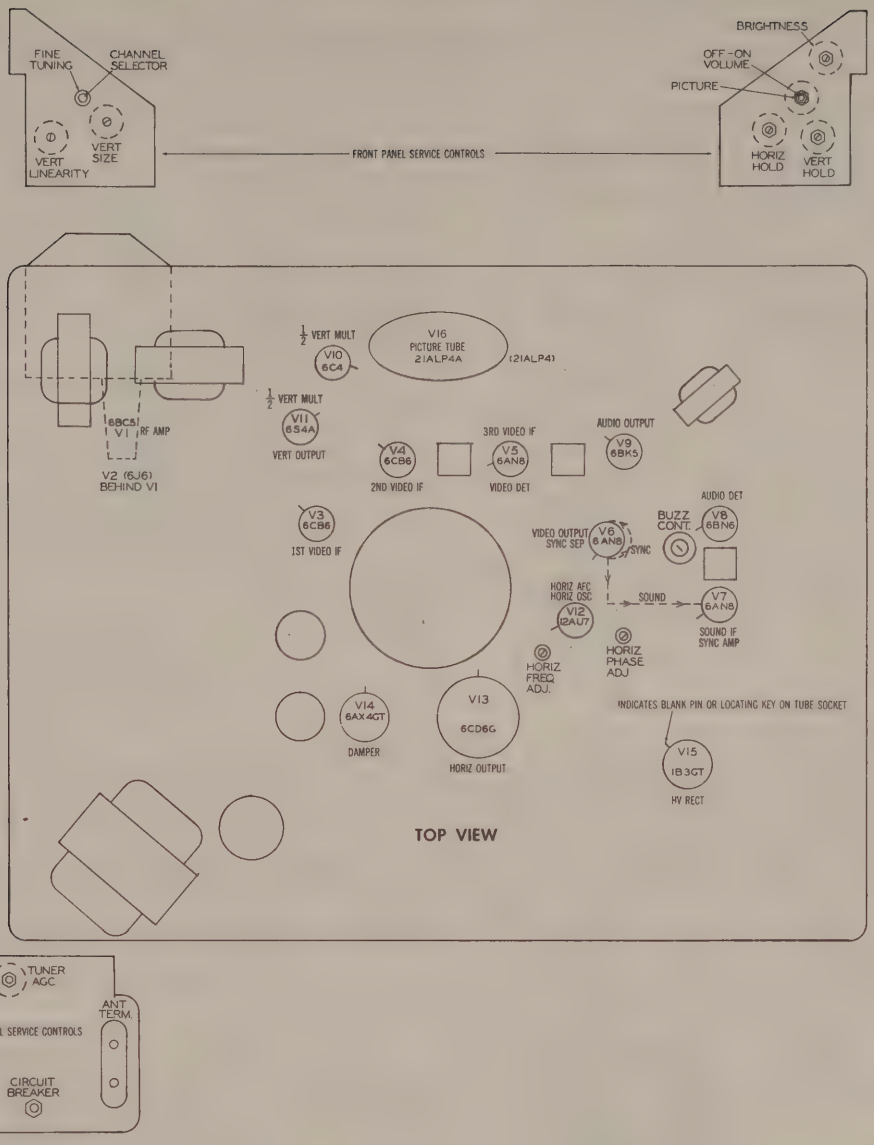


CAPACITOR IDENTIFICATION



CHASSIS BOTTOM V

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **Selenium Rectifiers (M1 & M2), Circuit Breaker (M4)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V6**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V6, V16**
Has pic, no sound - **V7, V8, V9**

SYNC FAILURE
No vert. sync - **V7, V10, V11**
No horiz. sync - **V7, V12**
No vert. or horiz. sync - **V6, V7**

SWEEP FAILURE
No raster, has sound - **V12, V13, V14, V15, V16**
No vertical deflection - **V10, V11**
Poor vert. linearity or foldover - **V10, V11**
Poor horiz. linearity or foldover - **V12, V13, V14**
Narrow picture - **V12, V13, V14, V15, M1, M2**
Vert. off freq. - **V7, V10, V11**
Horiz. off freq. - **V7, V12**

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use an isolation transformer to protect the test equipment.
The high voltage lead should be securely taped away from the chassis. Dot not remove the horizontal oscillator tube (V12) to disable the high voltage.

VIDEO IF ALIGNMENT

Remove the converter tube (V2) and replace with a 6J6 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.001MFD	High side to pin 8 (grid) of 6AN8 (V5). Low side to chassis.	25MC (10MC Swp.)	23. 9MC 26. 3MC	Any	Vert. amp. thru 10KΩ to point (A). Low side to chassis.	A1, A2, A3	Connect a short jumper from pin 5 (plate) to pin 6 (screen) of 6CB6 (V4). Adjust for response similar to Fig. 1 with markers at 90%. A3 is a coupling rod and affects bandwidth. Remove short from pin 5 to pin 6 of V4.
2.	Direct	High side to an unground ed tube shield floating over converter tube. Low side to chassis.	Not used	21. 3MC Unmod.	"	Use VTVM DC probe to point (A). Common to chassis.	A4	Adjust for maximum deflection.
3.	"	"	"	26. 5MC	"	"	A5	Adjust for maximum deflection. Repeat step 2.
4.	"	"	"	24. 0MC	"	"	A6	Adjust for maximum deflection. Attenuate generator to maintain not more than 2 volts deflection on VTVM.
5.	"	"	"	28. 25MC	"	"	A7	Adjust for MINIMUM deflection.
6.	"	"	"	25. 0MC	"	"	A8	Adjust for maximum reading. Attenuate generator to maintain not more than 2 volts deflection on VTVM. Repeat step 5.
7.	"	"	25MC (10MC Swp.)	21. 3MC 23. 8MC 26. 65MC	"	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.		Check for response similar to Fig. 2. Rock A8 for flat response. Increase sweep generator output and use high scope gain to view 22. 25MC trap region. Adjust A4 so that 21. 25MC appears at peak of pop-up portion proceeding trap notch. 22. 25MC should fall in trap notch. If response is not similar to Fig. 2, repeat steps 1 thru 7.

SOUND IF ALIGNMENT

Remove the dummy converter tube and replace the original 6J6 in its socket. Tune in a TV signal and adjust the fine tuning control until sound bars just appear in the picture. Adjust A9 fully counter clockwise, and then clockwise until the horizontal scanning lines are smooth and continuous. Readjust the fine tuning control for clearest picture and best sound. Insert an attenuator in series with the antenna and the receiver antenna terminals so that signal strength may be varied from weak to strong. If a suitable attenuator is not available stray feed the signal to the set by placing the antenna lead-in near the antenna terminals of the receiver.
Reduce the signal input to the receiver so that the signal falls below the limiting level of the 6BN6 limiter-detector as evidenced by a "hiss" in the sound. Adjust the secondary of the sound take-off transformer (A10), the sound if transformer (A11 and A12), the quadrature coil (A13) and the buzz control (R7) for maximum sound and minimum buzz. If hiss disappears during adjustments, increase attenuation until hiss reappears.

OSCILLATOR ALIGNMENT

The channel oscillator adjustment screws are reached through a hole just to the left of the fine tuning shaft. The correct oscillator adjustment screw is accessible through this hole as the channel switch is turned to each channel. Connect the negative lead of a 1. 5 volt bias battery to the ungrounded side of C41. Connect the positive lead to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	195MC (10MC Swp.)	193. 25MC 197. 75MC	10	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A14	Adjust to place sound marker in trap notch as in Fig. 3. Use high scope gain and increase sweep generator output to view trap region. Video marker should fall at 50% on response curve.
			213MC (10MC Swp.)	211. 25MC 215. 75MC	13		A15	
			207MC (10MC Swp.)	205. 25MC 209. 75MC	12		A16	
			201MC (10MC Swp.)	199. 25MC 203. 75MC	11		A17	
			189MC (10MC Swp.)	187. 25MC 191. 75MC	9		A18	
			183MC (10MC Swp.)	181. 25MC 185. 75MC	8		A19	
			177MC (10MC Swp.)	175. 25MC 179. 75MC	7		A20	
			85MC (10MC Swp.)	83. 25MC 87. 75MC	6		A21	
			79MC (10MC Swp.)	77. 25MC 81. 75MC	5		A22	
			69MC (10MC Swp.)	67. 25MC 71. 75MC	4		A23	
			63MC (10MC Swp.)	61. 25MC 65. 75MC	3		A24	
			57MC (10MC Swp.)	55. 25MC 59. 75MC	2		A25	

ALIGNMENT INSTRUCTIONS (cont)

RF AND MIXER ALIGNMENT

Leave bias battery connected as under "Oscillator Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	195MC (10MC Swp.)	193. 25MC 197. 75MC	10	Vert. Amp. thru 10KΩ to point (B). Low side to chassis.	A26, A27, A28	Adjust for response similar to Fig. 4 with markers at 90%.
10.	"	"	69MC (10MC Swp.)	67. 25MC 71. 75MC	4	"		Check for response similar to Fig. 4. If markers fall below 70% on any channel, make SLIGHT compromise adjustments of A26, A27 and A28 with channel selector set for that channel. Recheck all other channels to make sure they have not been seriously affected.
			213MC (10MC Swp.)	211. 25MC 215. 75MC	13			
			207MC (10MC Swp.)	205. 25MC 209. 75MC	12			
			201MC (10MC Swp.)	199. 25MC 203. 75MC	11			
			189MC (10MC Swp.)	187. 25MC 191. 75MC	9			
			183MC (10MC Swp.)	181. 25MC 185. 75MC	8			
			177MC (10MC Swp.)	175. 25MC 179. 75MC	7			
			85MC (10MC Swp.)	83. 25MC 87. 75MC	6			
			79MC (10MC Swp.)	77. 25MC 81. 75MC	5			
			63MC (10MC Swp.)	61. 25MC 65. 75MC	3			
			57MC (10MC Swp.)	55. 25MC 59. 75MC	2			
11.	"	"	Not used	105MC	2	Use VTVM DC probe to point (A). Common to chassis.	A29	Adjust for MINIMUM deflection.

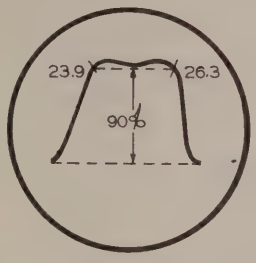


FIG. 1

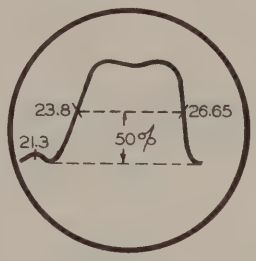


FIG. 2

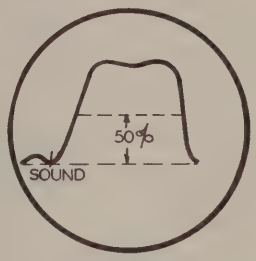


FIG. 3

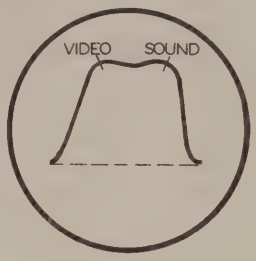
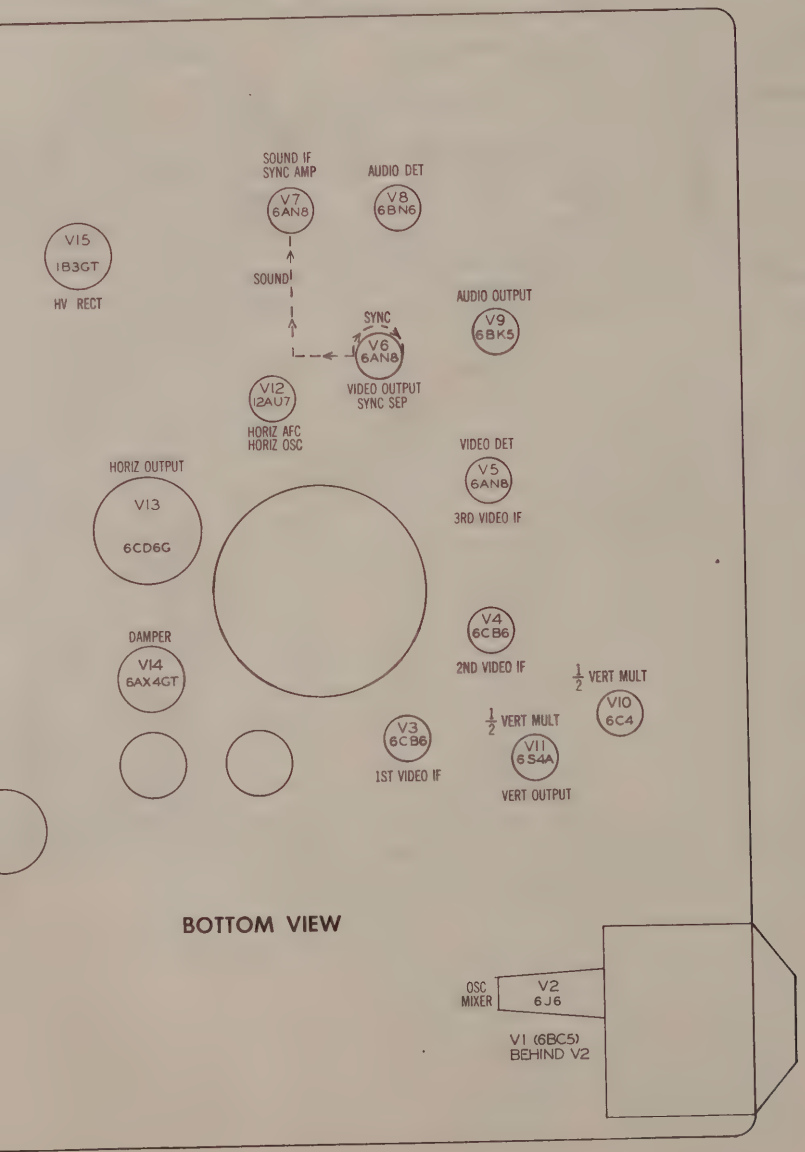


FIG. 4

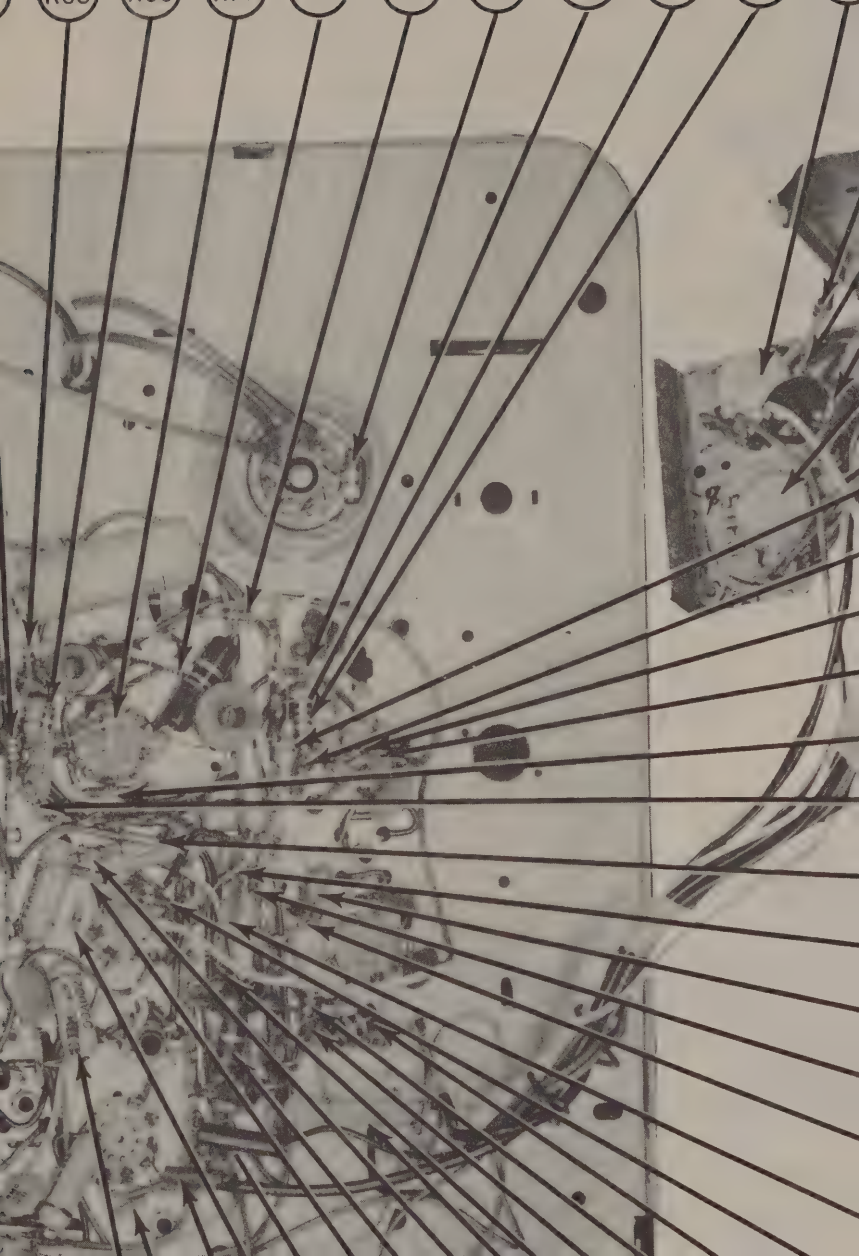
110KΩ	2.2Meg	0Ω	0Ω	.1Ω	† 5.6KΩ	† 2.5KΩ	1Meg	60Ω
8.2KΩ	22KΩ	0Ω	0Ω	.1Ω	† 33KΩ	† 33KΩ	470KΩ	47Ω
00Ω	.3Ω	0Ω	.1Ω	† 18KΩ	5.2Ω	† 220KΩ		
435Ω	NC	120KΩ	.1Ω	0Ω	150Ω	120KΩ	† 45Ω	TP
4.5Meg	NC	.1Ω	0Ω	▲ 4.5Meg	100KΩ	130KΩ		
NC	550Ω	2.2Meg	0Ω	.1Ω	2.2Meg	NC	NC	▲ 5.4KΩ
30KΩ	320KΩ	0Ω	0Ω	0Ω	† 30KΩ	1.5Meg	300KΩ	.1Ω
TP	.1Ω	0Ω	TP	470KΩ	TP	0Ω	† 5.6KΩ	TOP CAP ▲ 12Ω
TP	NC	70KΩ	NC	† 45Ω	NC	0Ω	.1Ω	

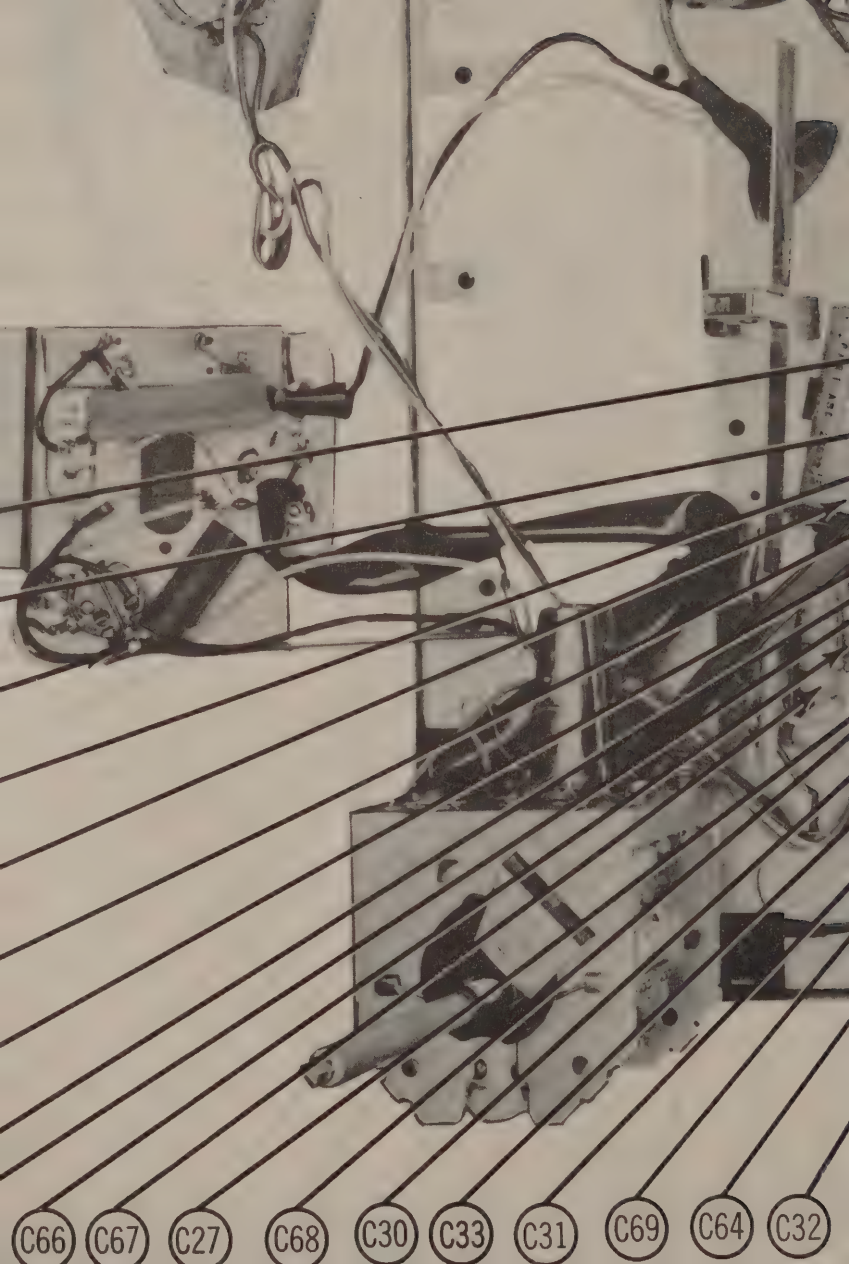
PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲ 237Ω
0Ω	33KΩ	PIN 6 † 45Ω	PIN 10 ▲ 50KΩ	PIN 11 † 200KΩ	PIN 12 .1Ω		

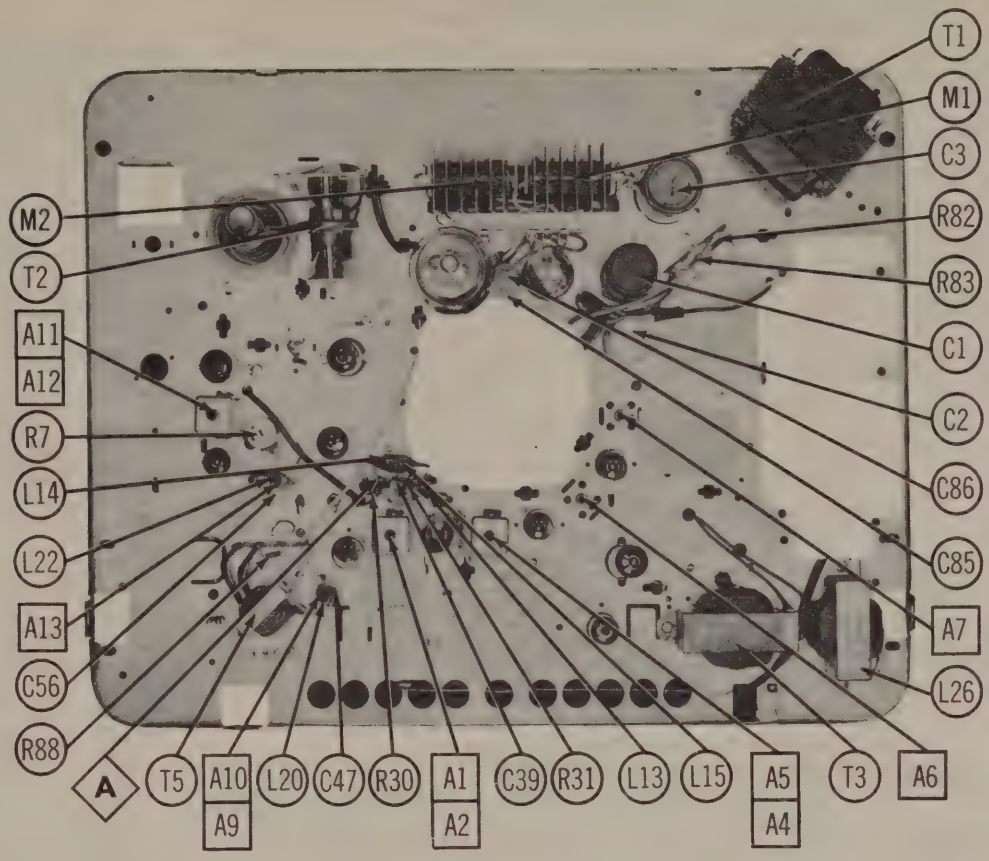
† MEASURED FROM OUTPUT OF M2.
▲ MEASURED FROM PIN 3 OF V14.
NC-NO CONNECTION
TP-TIE POINT



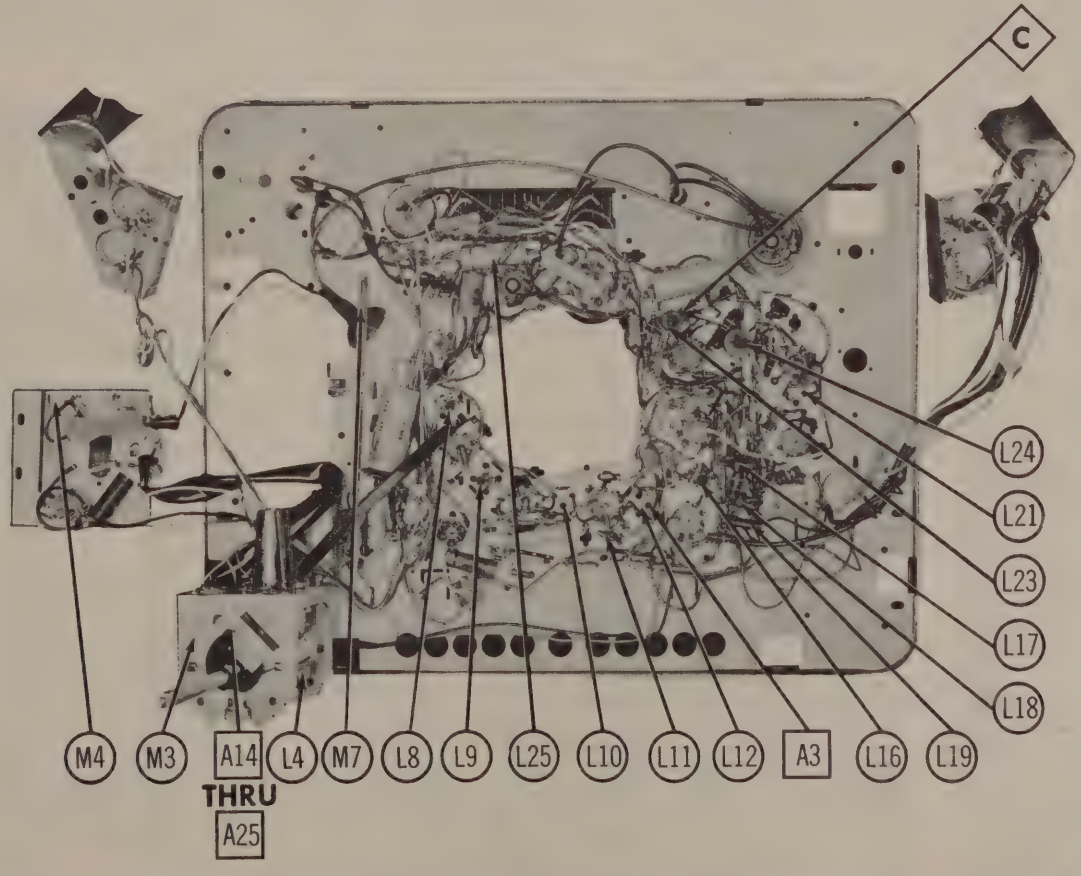
TUBE PLACEMENT CHART




C66
C67
C27
C68
C30
C33
C31
C69
C64
C32



CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

SET 315 FOLDER 13

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	REPLACEMENT DATA: TRUETONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	NOTES
V1	RF Amplifier	6BC5	6BC5	
V2	Mixer-Oscillator	6J6	6J6	
V3	1st. Video IF Amp.	6CB6	6CB6	
V4	2nd. Video IF Amp.	6CB6	6CB6	
V5	3rd. Video IF - Video Det.	6AN8	6AN8	
V6	Video Output-Sync Sep.	6AN8	6AN8	
V7	Sound IF - Sync Amplifier	6AN8	6AN8	
V8	Audio Detector	6BN6	6BN6	
V9	Audio Output	6BK5	6BK5	
V10	Vert. Mult.	6C4	6C4	
V11	Vert. Mult.-Vert. Output	6S4A	6S4A	
V12	Horiz. AFC-Horiz. Osc.	12AU7	12AU7	
V13	Horiz. Output	6CD6G	6CD6G	
V14	Damper	6AX4GT	6AX4GT	
V15	HV Rectifier	1B3GT	1B3GT	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: TRUETONE PART No.	REPLACEMENT DATA: CBS PART No.	REPLACEMENT DATA: GENERAL ELECTRIC PART No.	REPLACEMENT DATA: SYLVANIA PART No.	NOTES
V16	21ALP4A ①	21ALP4A① 21ALP4 21ALP4B ①	21ALP4A① 21ALP4 21ALP4A/B	21ALP4A ② 21ALP4 21ALP4A/B ②	① Aluminized ② Silver screen "85"

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: TRUETONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	■150	150	8C-22464	AFH1-24	XA004	FP117	TM-150-150	T-050	TVL-1428
C2	■150	150	8C-22463	AFH1-24	XA004	FP117	TM-150-150	T-050	TVL-1428
C3A	100	300	8C-25308	AFH3-99-75		FP326.6	TM-3127	T-537	TVL-3574
B	10	300						MT-0525	
C	50	50							
C4	5	300	8C-24174	PRS350V4	BR435	TC60	TD-8-350	FM-3508	TVA-1601
C5	50	350	8C-25532	PRS350V50	BR5035	TC68	TD-60-350	FM-4550	TVA-1613

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	TRUETONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C6	.1			NP0-S11	TCZ-1	TZ03	NP0A-010	ZT-5515	5TCCB-V1	
C7	6.8		13L8C6R81	NP0-DI6.8	TCZ-6R8	Z013	NP0A-6R8	ZT-5568	5TCCB-V68	
C8	6.8		13L8C6R81	NP0-DI6.8	TCZ-6R8	Z013	NP0A-6R8	ZT-5568	5TCCB-V68	
C9	2-10		31B-901		829-10					
C10	800		13M-320EA-102ZC							
C11	.5-3		31B-902		829-3		3115-01-0R5	CT565A		
C12	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C13	.5-3		31B-902		829-3		3115-01-0R5	CT565A		
C14	60		13M-320Q-600J							
C15	10		13L8Q100A							
C16	10		13L8UA100D							
C17	8.2		13L8C8R2D	NP0-DI8.2		Z016	NP0A-8R2			
C18	120		13L8V121K	BPD-00012	DD-121	G044	811-121	UC-5312	5GA-T12	
C19	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C20	800		13M-320EA-102ZC							
C21	800		13M-320EA-102ZC							
C22	.1	200	8K-23084	P288N-1	DF-104	CUB2P1		PT401	2TM-P1	
C23	10000		8G-20269	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C24	2.2			NP0-SI2.2	TCZ-2R2	TZ05	NP0A-2R2		5TCCB-V22	
C25	15			NP0-SI15	TCZ-15	TZ11	NP0K-150		5TCC-Q15	
C26	1000		8G-13201	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C27	5		8G-12166	NP0-SI5	TCZ-4R7	Z011	NP0A-050	ZT-555	5TCCB-V47	
C28	2000		8G-19522	SI2000	D6-202	TP56	GP2-333-202	UC-522	5HK-D2	
C29	1000		8G-13201	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C30	47		8G-19731	NP0-DI47	DD-470	Z033	831-470	MCB225	MS-447	
C31	1000		8G-13201	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C32	680		8G-21105	SI680	D6-681	TP50	GP2K-681	UC-5368	5GA-T68	
C33	5000		8G-13962	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C34	5000		8G-13962	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C35	5000		8G-13962	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C36	5000		8G-13962	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C37	1000		8G-13201	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C38	5		8G-12166	NP0-SI5	TCZ-4R7	Z011	NP0A-050	ZT-555	5TCCB-V47	
C39	5		8G-12166	NP0-SI5	TCZ-4R7	Z011	NP0A-050	ZT-555	5TCCB-V47	
C40	5000		8G-13962	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C41	.22	200	8K-23086	P288N-22		CUB2P22		PT4022	2TM-P22	
C42	.1	200	8K-23084	P288N-1	DF-104	CUB2P1		PT401	2TM-P1	
C43	51		8G-23793							
C44	3.3		8L-23551	NP0-SI3.3	TCZ-3R3	TZ06	NP0A-3R3	ZT-5533	5TCCB-V33	
C45	33		8G-19503	NP0-SI33	TCZ-33	TZ18	NP0L-330	ZT-5433	5TCC-Q33	
C46	.1	400	8K-23095	P488N-1	DF-104	CUB4P1		PT401	4TM-P1	
C47	100		8N1-113	NP0-DI100	D6-101	TZ30	NP0-337-101	ZT-531	5TCC-T1	
C48	.022	200	8K-23082	BPD-02	DD-203	CUB4S22	817-02	PT4122	2TM-S22	
C49	.022	600	8K-23104	BPD-02	DD-203	CUB6S22	817-02	PT6122	6TM-S22	
C50	30		14B-23772							Note 1
C51	470		8N1-121	1464-00047	D6-471	5R5T47	811-471	MCB245	10GA-T47	
C52	10000		8G-20269	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C53	1000		8G-13201	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	Note 2
C54	10000		8G-20269	BPD-01	DD-103	K080	811-01	DC-511	5HK-S1	
C55	10000		8G-20269	BPD-01	DD-103	K080	811-01	DC-511	5HK-S1	
C56	10		8G-11789	NP0-SI10	TCZ-10	TZ09	NP0A-100	ZT-541	5TCC-Q1	
C57	1000		8G-13201	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C58	.01	400	8K-23091	BPD-01	DD-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C59	.01	600	8K-23102	BPD-01	DD-103	CUB6S1	GP3-333-103	PT611	6TM-S1	
C60A	270			BPD-00027		TP41	811-271	UC-5327	5GA-T27	
B	10000		†17A-24212	BPD-01	†PC-263	K082	811-01	DC-511	5HK-S1	
C	25			BPD-000025		TP25	831-250	UC-5425	5GA-Q25	
C61	.047	200	8K-23083	BPD-05	DF-503	CUB2S47		PT4147	2TM-S47	
C62A	2000							DC-522		
B	5000		♦17A-22376	♦PA-110	♦PC-100	♦115TM1	♦1405-01	DC-525	♦V-1	
C	5000							DC-525		
C63	2000		8G-19522	SI2000	D6-202	TP56	GP2-333-202	UC-522	5HK-D2	
C64	.1	200	8K-23084	P288N-1	DF-104	CUB2P1		PT401	2TM-P1	
C65	.033	400	8K-23816			CUB6S33				
C66	.1	200	8K-23084	P288N-1	DF-104	CUB2P1		PT401	2TM-P1	

CAP

ITEM No.	RATING: CAP.	RATING: VOLT	TRUETONE PART No.	AEROVOX PART No.	CEN PA
C67	.1	400	8K-23095	P488N-1	DF
C68	.022	200		BPD-02	DD
C69	1000	2000	8G-24991	HVD30-1000	DD
C70	82		8N1-112	1469-000082	D6
C71	82		8N1-112	1469-000082	D6
C72	.047	400	8K-23094	BPD-05	DF
C73	.047	200	8K-23083	BPD-05	DF
C74	.022	200	8K-23082	BPD-02	DD
C75	.47	400	8K-23087	P488N-47	
C76	82		8N1-112	1469-000082	D6
C77	270		8N1-118	1469-00027	D6
C78	.01	600	8M-24439		
C79	1000		8N2-125	1464-001	
C80	.001	600	8K-23099	SI1000	D6
C81	.047	400	8K-23094	BPD-05	DF
C82	5000			BPD-005	DD
C83	.1	600	8K-23106	P688N-1	DF
C84	.15	200	8K-23085	P288-15	
C85	120	5000	8G-25325		DD
C86	72	5000			
C87	68	2000		HVD-30-68	DD
C88	5000		8G-13962	BPD-005	DD
C89	5000		8G-13962	BPD-005	DD
C90	5000		8G-13962	BPD-005	DD

Note 1. C50 is the capacity of the sound IF coupling shield
Note 2. Not used in some versions.
† Items C60A, C60B, C60C, R46A and R46B are combined
♦ Items C62A, C62B, C62C, R53A, R53B and R53C are co

C

ITEM No.	RATING: RESIST-ANCE	RATING: WATTS	TRUETONE PART No.	CENTRALAB PART No.	CL P
R1A	1000Ω	½	B10A-25102	F1-5	RT
B	1Meg	½		R2-52	
C	Switch			KB-1	
R2A	500KΩ	½	B10B-25165	AB-59	A4
B	Shaft		Not Req.	AK-4	KS
R3A	150KΩ	½	B10B-25168	AB-43	A4
B	Shaft		Not Req.	AK-4	KS
R4A	50KΩ	½	B10B-25169	AB-31	A4
B	Shaft		Not Req.	AK-4	KS
R5A	3Meg	½	B10B-25167	B-84	A4
B	Shaft		Not Req.	Not Req.	KS
R6A	2500Ω with 200Ω stop	½	B10B-25605	B-7	♦ A
B	Shaft		Not Req.	Not Req.	KS
R7	750Ω	1	A10D-23857		39
R8A	3Meg	½	B10A-25667	B-84-S	A4
B	Shaft		Not Req.	Not Req.	KS
C	Switch		Not Req.	Not Req.	SW

♦ Connect a 220Ω resistor in series with the right hand te terminal of the original control (control viewed from shaft
† Universal Replacement (Mallory Exact Duplicate Part N
* Concentrikit Equivalent: K-2 Kit, Base Elements and S

RE

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: TRUETONE PART No.	REPLACEMENT DATA: IRC PART No.	NO
R9	680KΩ	½	9B1-30	BTS-680K	
R10	4700Ω	½	9B1-70	BTS-4700	
R11	2200Ω	½	9B1-66	BTS-2200	
R12	10KΩ	½	9B1-74		
R13	15KΩ	½	9B1-76		
R14	220KΩ	½	9B1-27	BTS-220K	
R15	10KΩ	½	9B1-74	BTS-10K	
R16	10KΩ	½	9B1-74		
R17	2.2Meg	½	9B1-102	BTS-2.2Meg	
R18	220KΩ	½	9B1-90	BTS-220K	
R19	5600Ω	½	9B1-71		
R20	1000Ω	½	9B1-62	BTS-1000	
R21	1000Ω	½	9B1-62	BTS-1000	
R22	47Ω	½	9B1-46	BTS-47	
R23	18KΩ	½	9B1-77		
R24	1000Ω	½	9B1-62	BTS-1000	
R25	1000Ω	½	9B1-62	BTS-1000	
R26	62Ω 5%	½	9B1-130	BTS-62	
R27	33KΩ	½	9B1-80		
R28	1000Ω	½	9B1-62	BTS-1000	
R29	82Ω	½		BTS-82	
R30	1Meg	½	9B1-98	BTS-1Meg	
R31	4700Ω	½	9B1-70	BTS-4700	
R32	1Meg	½	9B1-98	BTS-1Meg	
R33	47Ω	½	9B1-46	BTS-47	
R34	5600Ω	2	9B4-71	BTB-5600	
R35	100KΩ	½	9B1-86	BTS-100K	
R36	33KΩ	½	9B1-80	BTS-33K	
R37	470KΩ	½	9B1-86	BTS-470K	No
R38	33KΩ	1	9B2-80	BTA-33K	
R39	47Ω	½	9B1-46	BTS-47	
R40	680Ω	½	9B1-60	BTS-680	
R41	220KΩ	½	9B1-90	BTS-220K	
R42	18KΩ	2	9B4-77	BTB-18K	
R43	22KΩ	½	9B1-78	BTS-22K	No
R44	150Ω	1	9B2-52	BTA-150	
R45	10KΩ	½	9B1-74	BTS-10K	
R46A	220KΩ		† 17A-24212	BTS-220K	
B	2.2Meg			BTS-2.2Meg	
R47	100KΩ	½	9B1-86	BTS-100K	
R48	560KΩ	½	9B1-95	BTS-560K	
R49	22KΩ	½	9B1-78	BTS-22K	
R50	1Meg	½	9B1-98	BTS-1Meg	

Note 1. Some versions use a
Note 2. Not used in some ve
Note 3. Some versions use a
Note 4. Some versions use a
Note 5. Some versions use a
† Items R46A, R46B, C60A,
♦ Items R53A, R53B, R53C,

DESCRIPTIONS

S (cont)

REPLACEMENT DATA				NOTES
RNELL-BILIER T No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
4P1		PT401	4TM-P1	
4S22	817-02	PT4122	2TM-P22	
	3KV-102	DC3021	20GA-D1	
	801-820		10GA-Q82	
	801-820		10GA-Q82	
4S47		PT4147	4TM-S47	
2S47		PT4147	2TM-S47	
4S22	817-02	PT4122	2TM-S22	
4P47		PT4047	4TM-P47	
	801-820		10GA-Q82	
	811-271	MC241	10GA-T27	
1	811-102	MCB255	MS-21	
3D1	GP2L-102	PT621	6TM-D1	
4S47		PT4147	4TM-S47	
	811-005	DC-525	5HK-D5	Note 2
3P1		PT601	6TM-P1	
3P15		PT4015	2TM-P15	
				Note 2
8	3KV-680	DC30468	20GA-Q68	
	811-005	DC-525	5HK-D5	
	811-005	DC-525	5HK-D5	
	811-005	DC-525	5HK-D5	

e unit.

S

IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
QJ-907	UF13L UR16A † US-26	Picture (Panel) Volume (Rear) Attach to R1B.
11-133	U-50	Brightness
ot Req.	Not Req.	Attach to R2A.
11-129	U-43	Vert. Hold
ot Req.	Not Req.	Attach to R3A.
11-123	U-35	Horiz. Hold
ot Req.	Not Req.	Attach to R4A.
11-140	U059	Vert. Size
ot Req.	Not Req.	Attach to R5A.
Q11-112	♦ TA352L	Vert. Linearity
ot Req.	Not Req.	Attach to R6A.
		Buzz-Wire Wound
11-140	U-59	Tuner AGC
ot Req.	Not Req.	Attach to R8A.
3-1	US-26	Attach to R8A.

e control and the lead connecting to the same
ls down).

& P1-226 (Panel)
& R2-310 (Rear)
Switch)

EM o.	RATING OHMS	RATING WATT	REPLACEMENT DATA TRUETONE PART No.	REPLACEMENT DATA IRC PART No.	NOTES
1	4700Ω	1	9B2-70	BTA-4700	
2	1000Ω	½	9B1-62	BTS-1000	
3A	22KΩ			BTS-22K	
B	8200Ω		♦ 17A-22376	BTS-8200	
C	8200Ω			BTS-8200	
4	100KΩ	½	9B1-86	BTS-100K	Note 3
5	4700Ω	½	9B1-70	BTS-4700	
6	220KΩ	½	9B1-66	BTS-220K	
7	82KΩ	½	9B1-85	BTS- 82K	
8	2.2Meg	½	9B1-102	BTS-2.2Meg	
9	100KΩ	½	9B1-86	BTS-100K	
0	3.3Meg	½		BTS-3.3Meg	Note 4
1	4700Ω	5	9C12-1107		
2	560Ω	½	9B1-59		
3	560Ω	½	9B1-59		
4	330KΩ	½	9B1-92		
5	820KΩ	½	9B1-97	BTS-820K	
6	220KΩ	½	9B1-90		
7	68KΩ	½	9B1-84		
8	3900Ω	½	9B1-69		
9	39KΩ	½	9B1-81	BTS-39K	
0	18KΩ	½	9B1-77		
1	100KΩ	½	9B1-86	BTS-100K	
2	10Meg	½	9B1-110		
3	33KΩ	½	9B1-80		Note 5
4	68KΩ	½	9B1-84		
5	82KΩ	½	9B1-85		
6	4700Ω	½	9B1-17		
7	33KΩ	½	9B1-80		
8	82KΩ	1	9B2-85		
9	100Ω	½	9B1-50	BTS-100	
0	470KΩ	½	9B1-94		
1	5600Ω	5	9C12-1108		
2	82K	½	9B1-85	BTS-82K	Note 2
3	82K	½	9B1-85	BTS-82K	Note 2
4	4.7Ω	½	9C1-1071	BW½-4.7	
5	2700Ω	3	9C11-1104		
6	2500Ω	5	9C-24033	PW7-2500	
7	4.7Ω	15	9C-25668		
8	470KΩ	½	9B1-29	BTS-470K	
9	470KΩ	½	9B1-29	BTS-470K	
0	470KΩ	½	9B1-29	BTS-470K	
1	470KΩ	½	9B1-29	BTS-470K	

istor in this application.

stor in this application.
eistor in this application.
stor in this application.
re combined in one unit.
C62C are combined in one unit.

TRANSFORMER (FILAMENT)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA TRUETONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC ⑧ .6A	12.6VCT ⑧ 4.55A			12D-25563	F5905 ②	P3085 ③ ④		21F24 ② ④	F-42A ①

① Parallel and phase 12.6V windings.
② Connect 6.3V ⑧ 3A in series and phase, tape 6.3VCT.
③ Parallel and phase 2-13V ⑧ 3A windings to obtain 13V ⑧ 6A.
④ Drill new mounting holes.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA TRUETONE PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	Horiz. Output Trans.	12E-25423	FB448 *	HVO-58 *		X126 *		FLY-80 *	D-83 *
T3	Vert. Output Trans.	12E-19048-2	Z1900 ① ②	A-3038 ①	222T1 ③	V305 ①	A-8143 ①	26S53 ①	A-99X ①
T4A	Yoke(90°)Horiz. (18.5MH)	201-25360	DF607 ⑤ ⑥ ⑦	MDF-92 ⑤ ⑥ ⑧	235D1 ⑤ ⑥ ⑦	Y90F19/43 ⑤ ⑥ ⑦	DY-16A ⑤ ⑥ ⑧	Y-16 ⑤ ⑥ ⑦	Y-41-1 ⑤ ⑥ ⑧
B	Vert. (39MH)	16M-23770 ④							

① Connect as auto transformer.
② Use 10 to 1 turns ratio.
③ Drill new mounting hole(s).
④ Yoke rear cover and centering device.
⑤ Use original rear cover and centering device.
⑥ Loosen and rotate core clamp to duplicate original shield mounting
⑦ Connect horizontal damping network across terminals #3 and #7. Use original if necessary.
⑧ Use original horizontal yoke damping network if necessary.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	8	8	8		8		8	8
	3	3	3		6		6	3
	2	3	3		6		6	3
	1	6	6		2		2	6

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA TRUETONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T5	6.3KΩ	3-4Ω	12C-23704	Z1000 ①	A2931 ①	A3856 ①	26S48 ①	S-7X ①	① Drill one new mtg. hole.

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA TRUETONE PART No.	QUAM PART No.	RCA TYPE No.	NOTES
SP1	6"	PM	3-4Ω	18A-21433 ①	6A1	229S1	① Used in Models 2D1512A, 2D1514A.
	5"	PM	3-4Ω	18A-24682 ②	5A07	20S52	② Used in Model 2D2525A.

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA TRUETONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Matching Trans.	0Ω	0Ω	31T-426				
L2	Ant. Matching Trans.	0Ω	0Ω	31T-426				
L3	IF Trap	.2Ω		31T-424				
L4A	Ant., RF, Mixer Grid, Osc. Coils	0Ω		31M-32-CA				Channel 2
B	Ant., RF, Mixer Grid, Osc. Coils	0Ω		31M-33-CA				Channel 3
C	Ant., RF, Mixer Grid, Osc. Coils	0Ω		31M-34-CA				Channel 4
D	Ant., RF, Mixer Grid, Osc. Coils	0Ω		31M-35-CA				Channel 5
E	Ant., RF, Mixer Grid, Osc. Coils	0Ω		31M-36-CA				Channel 6
F	Ant., RF, Mixer Grid, Osc. Coils	0Ω		31M-37-AA				Channel 7
G	Ant., RF, Mixer Grid, Osc. Coils	0Ω		31M-38-AA				Channel 8
H	Ant., RF, Mixer Grid, Osc. Coils	0Ω		31M-39-AA				Channel 9
I	Ant., RF, Mixer Grid, Osc. Coils	0Ω		31M-40-AA				Channel 10
J	Ant., RF, Mixer Grid, Osc. Coils	0Ω		31M-41-AA				Channel 11
K	Ant., RF, Mixer Grid, Osc. Coils	0Ω		31M-42-AA				Channel 12
L	Ant., RF, Mixer Grid, Osc. Coils	0Ω		31M-43-AA				Channel 13
L5	Fil. Choke	0Ω						
L6	RF Coil	0Ω		25A-127-01				
L7	1st Video IF	.9Ω		31U-502				
L8	28.25MC Trap	.1Ω		13M-25686				
L9	2nd Video IF	.1Ω		201-23829				
L10	3rd Video IF	.1Ω		201-24043				
L11	RF Choke	2.5Ω		201-20265	19-3036	TV-180	6176	Tapped-Includes resistors & caps. 36 Microhenries
L12	4th Video IF	.2Ω	.2Ω	13B-23887				
L13	Series Peaking Coil	3.5Ω		16A-22923	19-6022		6152	22 Microhenries

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	TRUETONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L14	Series Peaking Coil	3.5Ω		16A-22923	19-6022		6152	22 Microhenries
L16	Shunt Peaking Coil	24Ω		16A-19365	19-4400	TV-190	4648	410 Microhenries
L16A	4.5MC Trap	1.9Ω		201-23729				
B	1st Sound IF	3Ω						
L17	Series Peaking Coil	8.5Ω		16A-21391	19-3300		6155	305 Microhenries
L18	Shunt Peaking Coil	7.5Ω		16A-20970	19-3250	TV-185	6181	270 Microhenries
L19	Series Peaking Coil	2.5Ω		16A-24090	19-1005		4612	11 Microhenries
L20	4.5MC Trap	1.1Ω		16A-25441	20-1004	TV-151	1469	
L21	2nd Sound IF	.3Ω	.3Ω	201-23873				
L22	Quadrature Coil	5.2Ω		201-23727			1480	
L23	RF Choke	1.5Ω		16A-21701	19-1005		4612	8 Microhenries

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES.		REPLACEMENT DATA							NOTES
	PRI.	SEC.	TRUETONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No.	Ram PART No.	Thordarson PART No.	
L24	85Ω		12E-24440			6212				Horiz. osc. tapped @ 60Ω, core part #51A-24699
L25	37Ω		13M-24441			6314				Horiz. stabilizer core part #51A-24699

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ~)	TRUETONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L26	.290A	45Ω	1.5HY	16B-25146	C5037①	C2996 ①	C2326 ①	26C44	C-17X ①

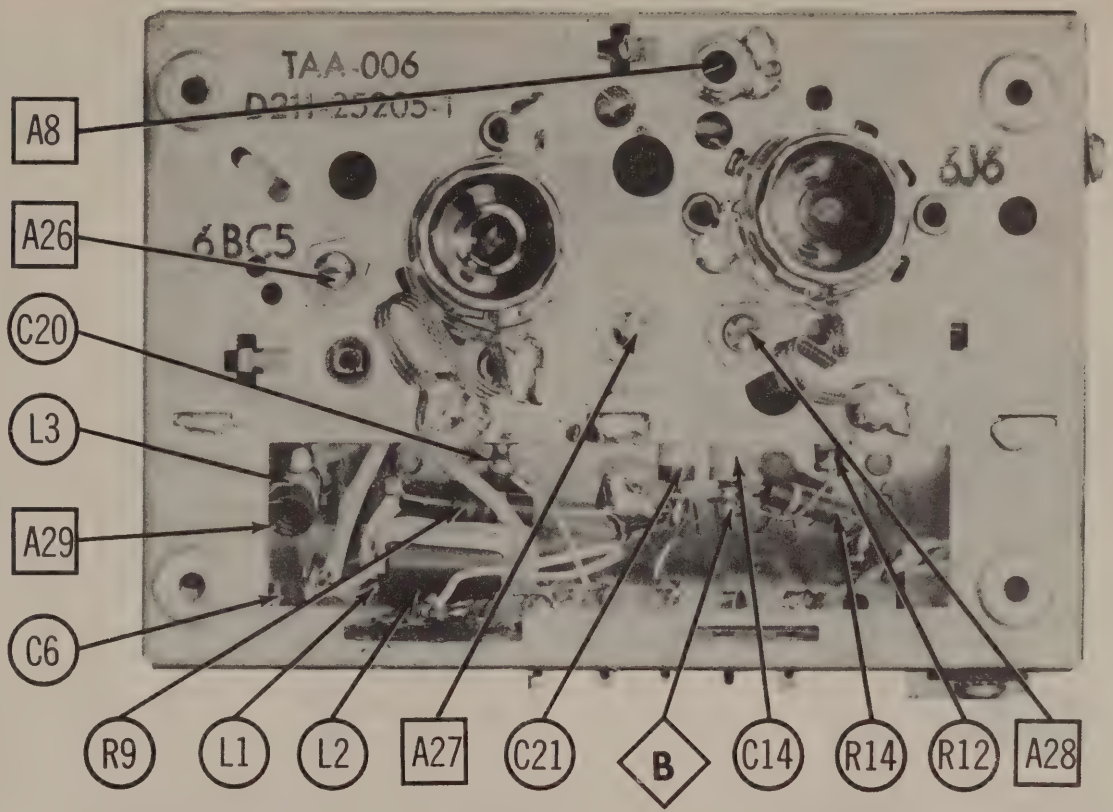
① Drill one new mounting hole.

SELENIUM RECTIFIER

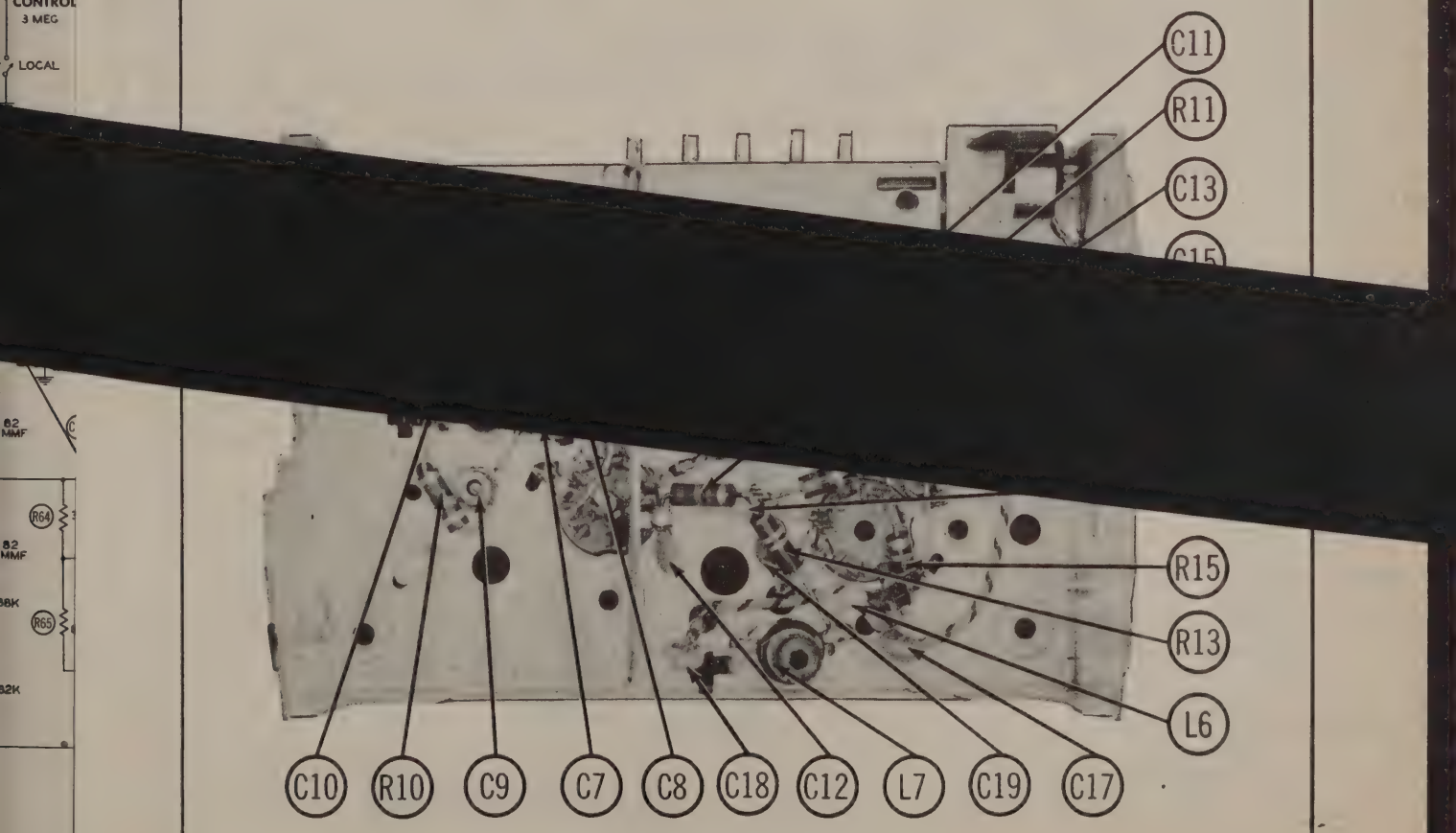
ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	TRUETONE PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.320A DC	21J25315	1241A	MR350	6S350	6QA2	350A	
M2	.320A DC	21J25315	1241A	MR350	6S350	6QA2	350A	

MISCELLANEOUS

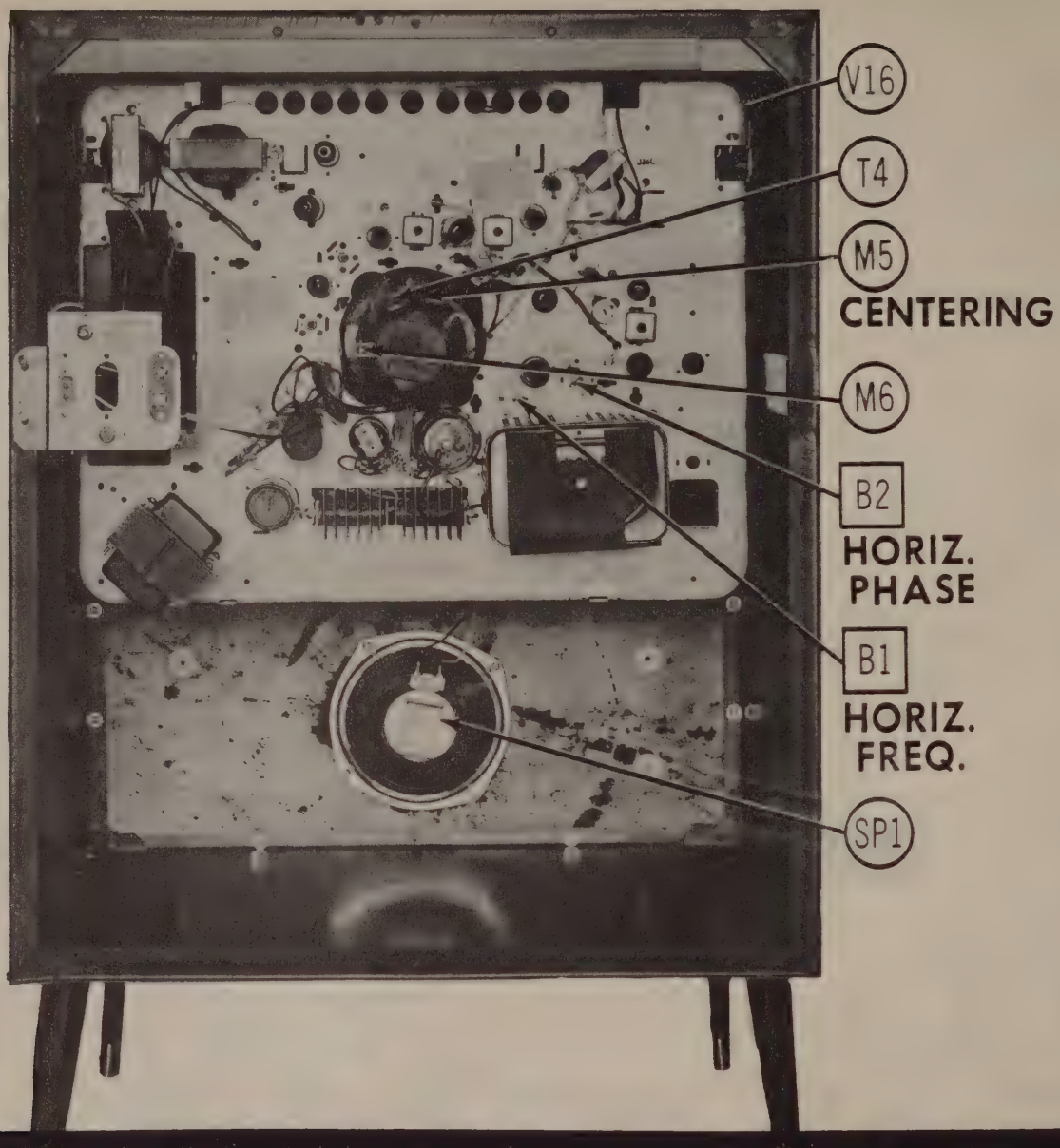
ITEM No.	PART NAME	TRUETONE PART No.	NOTES
M3	Tuner	D21l-25205-1	VHF (Pentode)
M4	Circuit Breaker	20F-25568	Low voltage protection
M5	Centering Device	16M-23770	Includes deflection yoke (T4) rear cover
M6	Ion Trap	16M-19705	
M7	Correction Magnet	B16M-22873	
	Cabinet	200-25382	Model 2D-1512A
	Cabinet	200-25382-1	Model 2D-1514A
	Cabinet	200-25381	Model 2D-2525A
	Knob	5B-25184-A56	Station selector
	Knob	5B-25177-A29	Fine tuning
	Knob	5B-25183-A56	On-off-volume
	Knob	5B-25178-A29	Picture
	Knob	5B-25176-A29	Control (3 used)
	Safety Glass	30M-25204	



RF TUNER-TOP VIEW



RF TUNER-BOTTOM VIEW



HORIZONTAL SWEEP

Turn the set on and tune in a TV station, preferably with a test pattern.

Turn the horizontal hold control (R4) to its mid-range position.

Connect a short clip lead across L25) Adjust horizontal oscillator slug (B1) until the picture synchronizes horizontally. Remove clip lead from L25. Connect the vertical amplifier of the oscilloscope thru a low capacity probe to point ⓒ. Low side to chassis. Adjust the horizontal stabilizer coil slug (B2) until a waveform similar to Fig. 5 is obtained. While making this adjustment, keep the picture in sync with the horizontal hold. Remove scope connection. Check range of horizontal hold control (R4). Turn R4 fully counter clockwise then back clockwise. The picture should fall out of sync at each extreme setting of R4.

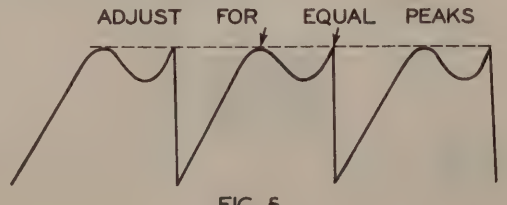


FIG. 5

PHOTOFACT* Folder

*TRADE MARK

WELLS-GARDNER MODELS
321AM58 Series, 321AS58 Series

IMPORTANT FILING NOTICE

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Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

WELLS-GARDNER MODELS
321AM58 Series, 321AS58 Series

TRADE NAME	Wells-Gardner Models 321AM58 Series, 321AS58 Series
MANUFACTURER	Wells-Gardner Co., 2701 N. Kildare Avenue, Chicago 39, Illinois
TYPE SET	Television Receiver
TUBES	Twenty-one
POWER SUPPLY	110-120 Volts AC-60 Cycle RATING 1.4 Amp. @ 117 Volts AC
TUNING RANGE–	Channels 2 thru 13 VHF, 14 thru 83UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

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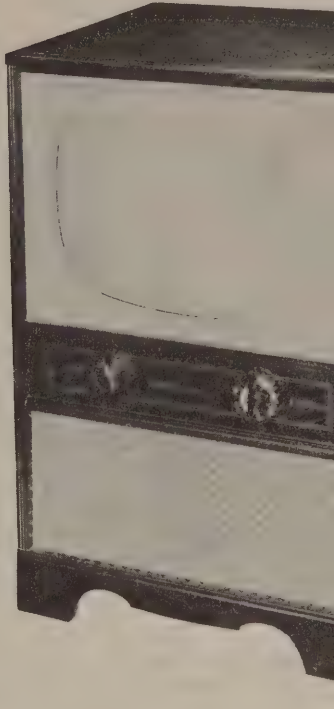
TOFACT* Folder

RETMA MEMBER

WELLS-GAR
321AM58 Serie



DISASSEMBLY INSTRUCTIONS

MOVAL

push-on type control knobs and fine tuning front panel of cabinet.

2 metal screws and 2 wood screws. Remove

wood screws. Remove antenna terminal

ct speaker leads.

5 chassis bolts. Remove chassis.

4 speaker nuts. Remove speaker.

MODELS

321AM58 Series, 321AS58 Serie

SERVICING IN THE FIELD

CILLATOR ADJUSTMENTS

djustment of the VHF tuner oscillator circuit omplished as follows:

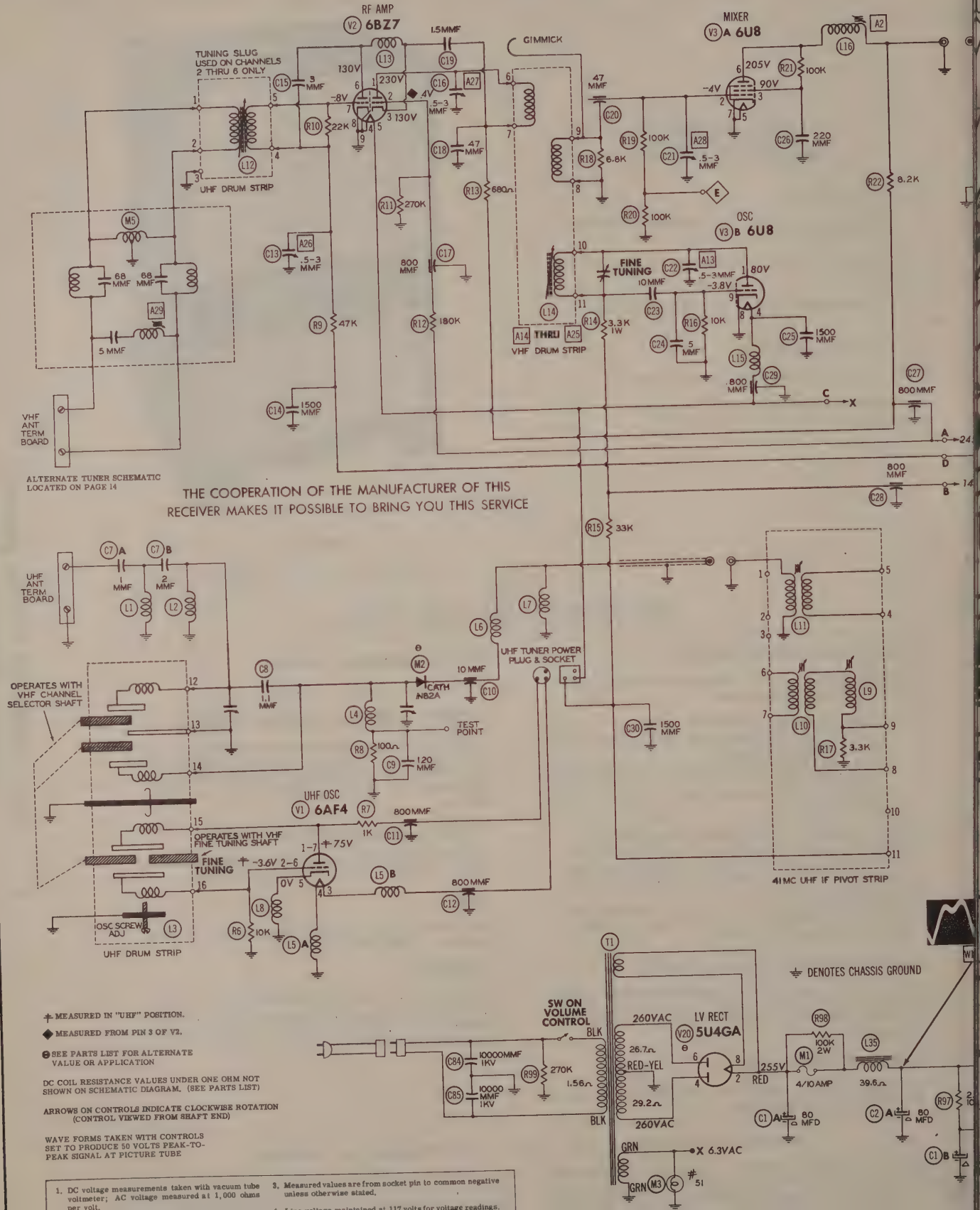
the selector knob to VHF position.
ne in a TV station and set the fine tuning control center of its range.

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 5.

HORIZONTAL OSCILLATOR FIELD ADJ

Adjustment of the horizontal oscillator (L from rear panel of chassis. L32 is used hold control. Adjust L32 until picture sy



✚ MEASURED IN "UHF" POSITION.

◆ MEASURED FROM PIN 3 OF V2.

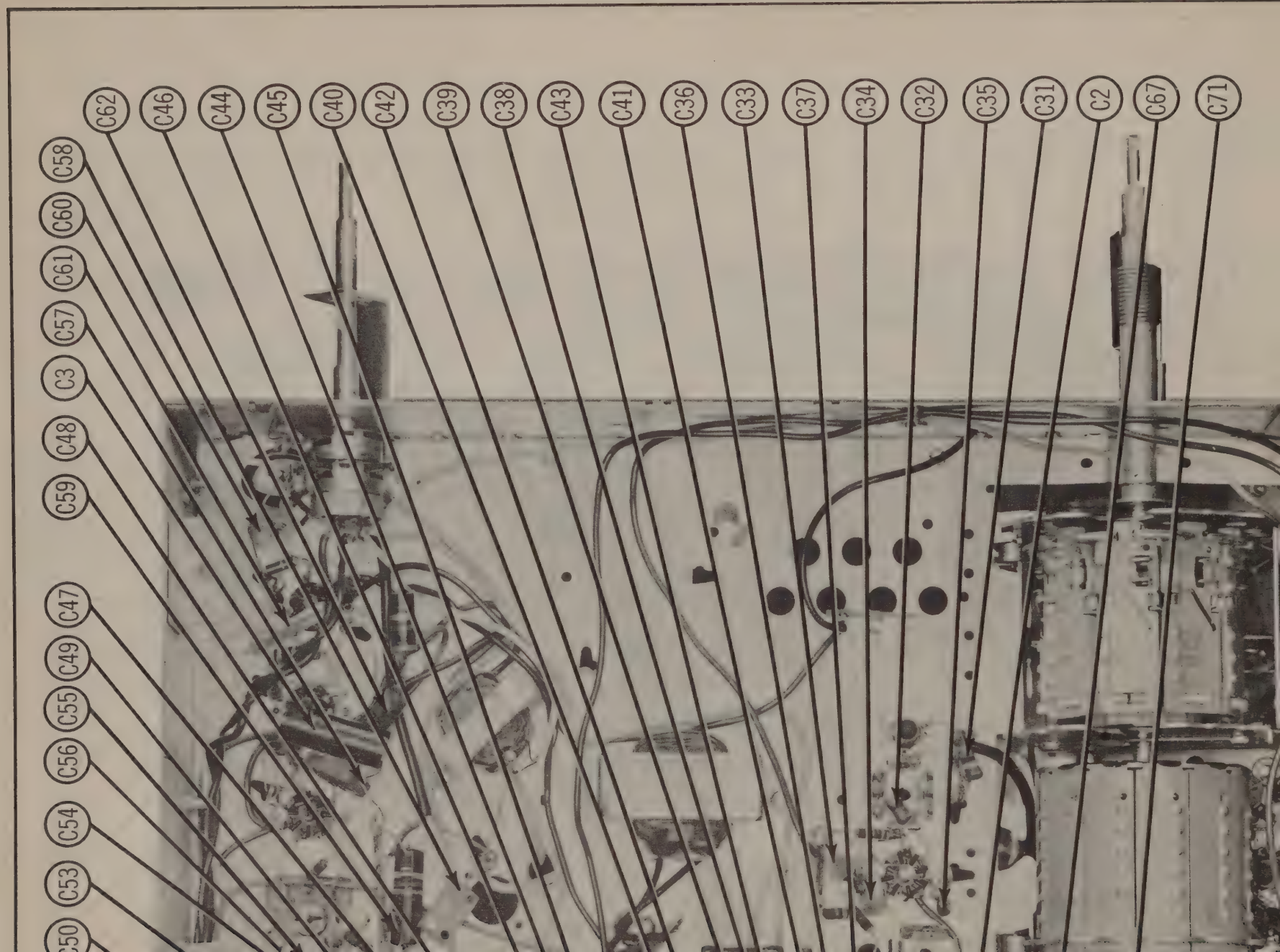
⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM. (SEE PARTS LIST)

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltage measured at 1,000 ohms per volt.
3. Measured values are from socket pin to common negative unless otherwise stated.


C62
C46
C44
C45
C40
C42
C39
C38
C43
C41
C36
C33
C37
C34
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C35
C31
C2
C67
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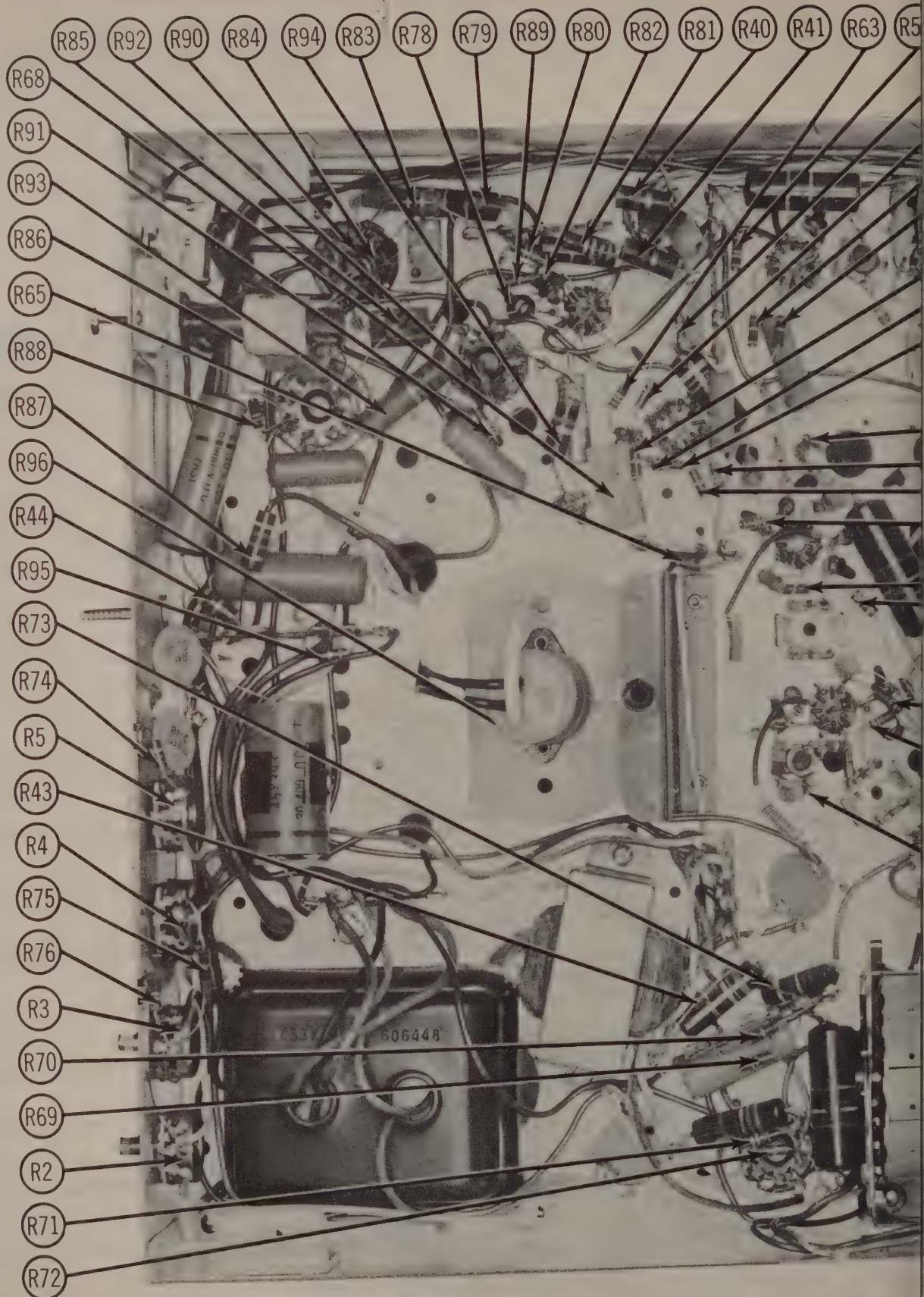
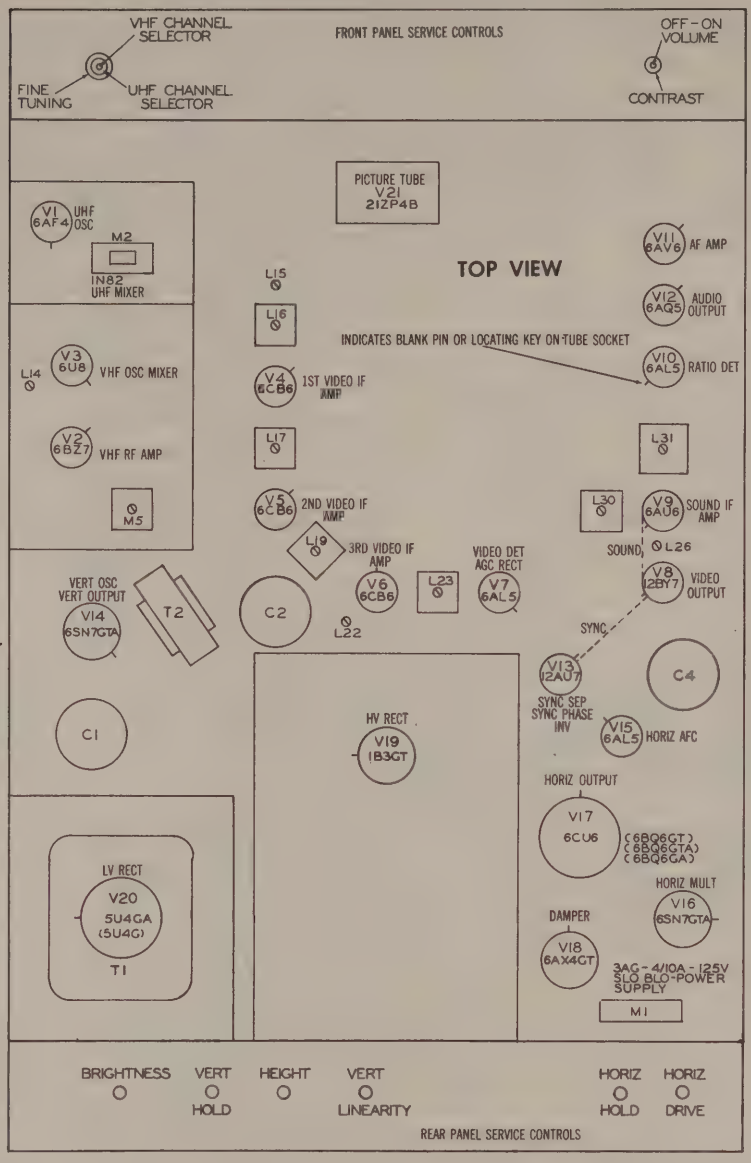
C54
C53
C50



CHASSIS BOTTOM VIE

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **V20, Fuse (M1)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V3, V4, V5, V6, V7, V8 (V1 UHF only)**
No pic, no sound, has snow - **V2, V3, V4**
No pic, has sound, has raster - **V8, V21**
Has pic, no sound - **V9, V10, V11, V12**

SYNC FAILURE
No vert. sync - **V13, V14**
No horiz. sync - **V13, V15, V16**
No vert. or horiz. sync - **V13**

SWEEP FAILURE
No raster, has sound - **V16, V17, V18, V19, V21**
No vertical deflection - **V14**
Poor vert. linearity or foldover - **V14**
Poor horiz. linearity or foldover - **V16, V17, V18**
Narrow picture - **V16, V17, V18, V19, V20**
Vert. off freq. - **V13, V14**
Horiz. off freq. - **V13, V15, V16**

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from chassis.

VIDEO IF ALIGNMENT

Connect the negative lead of a 1. 5 volt battery to the ungrounded side of C33A. Connect the positive lead to chassis. Remove the VHF RF amplifier (V2) from its socket.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over converter tube (V3). Low side to chassis.	44MC (10MC Swp.)	41. 25MC 45. 75MC 47. 25MC	Any non-interfering channel	Vert. Amp. thru detector (Fig. 1) to pin 5 (plate) of 1st Video IF Tube (V4). Low side to chassis.	A1, A2, A3, A4	Adjust A1 to place 47. 25MC marker in trap notch as in Fig. 2. Adjust A2, A3 and A4 for response similar to Fig. 2. A2 and A3 affect flat portion of the curve. A4 positions the 41. 25MC marker. Make sure 45. 75MC marker is on peak as shown or the 44. 5MC marker on overall response curve (Fig. 3) will be incorrect.
2.	"	"	Not used	42. 5MC (Unmod.)	"	Use VTVM DC probe to point Ⓐ. Common to chassis.	A5	Increase bias from 1. 5 volts to 4. 5 volts at ungrounded side of C33A. Attenuate generator output to maintain 1 volt at VTVM. Adjust for maximum deflection.
3.	"	"	"	45. 3MC	"	"	A6	"
4.	"	"	"	43. 9MC	"	"	A7	"
5.	"	"	"	41. 25MC	"	"	A8	"
6.	"	"	44MC (10MC Swp.)	41. 25MC 42. 25MC 42. 5MC 43. 9MC 44. 5MC 45. 3MC 45. 75MC 47. 25MC	"	Vert. Amp. thru 10KΩ to point Ⓐ. Low side to chassis.		Check for response curve similar to Fig. 3. SLIGHTLY retouch A5 thru A8 to obtain desired response. If A1 thru A4 requires retouching, step 1 should be repeated.

4.5MC TRAP ALIGNMENT

Set contrast control for maximum.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
7.	10KΩ	High side thru 10KΩ to pin 2 (plate) of 6AL5 (V7). Low side to chassis.	4. 5MC (Unmod.)	Any non-interfering channel	DC probe to pin 11 (cathode) of picture tube. Common to chassis.	A9	Adjust for MINIMUM deflection on VTVM.

ALTERNATE 4. 5MC TRAP ALIGNMENT

Replace the VHF RF amplifier tube (V2) in its socket. Remove bias supply from ungrounded side of C33A. Tune in a TV station and adjust A9 for MINIMUM 4. 5MC beat interference in picture.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Remove the 3rd video IF amplifier tube (V6) from its socket.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
8.	10KΩ	High side thru 10KΩ to pin 2 (plate of 6AL5 (V7). Low side to chassis.	4. 5MC (Unmod.)	Any	DC probe to point Ⓑ. Common to chassis.	A10	Adjust for maximum deflection.
9.	"	"	"	"	DC probe to point Ⓒ. Common to chassis.	A11	Use only enough output to provide useable indication at VTVM. Adjust for maximum deflection.
10.	"	"	"	"	DC probe to point Ⓓ. Common to chassis.	A12	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Replace V6 in its socket.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Remove the 3rd video IF amplifier tube (V6) from its socket.
Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	10KΩ	High side thru 10KΩ to pin 2 (plate) of 6AL5 (V7). Low side to chassis.	4. 5MC (450KC Swp)	4. 5MC	Any	Vert. Amp. to point Ⓑ. Low side to chassis.	A10	Adjust for curve of maximum amplitude and symmetry similar to Fig. 4.
9.	"	"	"	"	"	Vert. Amp. to point Ⓒ. Low side to chassis.	A11	Disconnect stabilizing capacitor (C3). Adjust for curve of maximum amplitude and symmetry similar to Fig. 4.
10.	"	"	"	"	"	Vert. Amp. to point Ⓓ. Low side to chassis.	A12	Reconnect C3. Adjust so that 4. 5MC occurs at center of crossover lines as in Fig. 5. SLIGHTLY retouch A-11 for curve of maximum amplitude and straightness of crossover lines. Replace V6 in its socket.

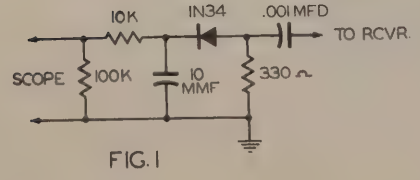


FIG. 1

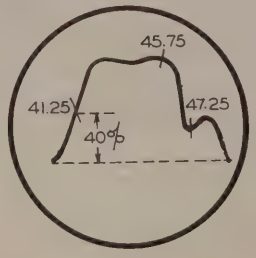


FIG. 2

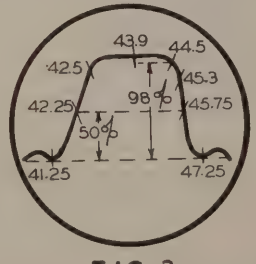


FIG. 3

ALIGNMENT INSTRUCTIONS (cont)

VHF OSCILLATOR ALIGNMENT

Complete oscillator alignment may not be necessary. If the oscillator seems to be off frequency approximately the same amount for a majority of the channels it may be possible to correct them in one step using A13. It should be noted that this is an all channel oscillator circuit adjustment and should not be used to correct any individual channel. If adjustment A13 will not bring all channels well within the range of the fine tuning control it will be necessary to adjust the channel strip adjustment screw for each channel that is off frequency. The channel oscillator adjustment screws are reached through a hole just to the left of the channel switch shaft (hole extends through UHF Tuner).
The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel. Replace VHF RF amplifier (V2) in its socket. Connect the negative lead of a 4. 5V bias supply to the ungrounded side of C33A. Connect the positive lead to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	213MC (10MC Swp.)	211. 25MC 215. 75MC	13	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A14	Adjust to place sound marker in trap notch as in Fig. 6. Video marker should be at 50%.
			207MC (10MC Swp.)	205. 25MC 209. 75MC	12		A15	
			201MC (10MC Swp.)	199. 25MC 203. 75MC	11		A16	
			195MC (10MC Swp.)	193. 25MC 197. 75MC	10		A17	
			189MC (10MC Swp.)	187. 25MC 191. 75MC	9		A18	
			183MC (10MC Swp.)	181. 25MC 185. 75MC	8		A19	
			177MC (10MC Swp.)	175. 25MC 179. 75MC	7		A20	
			85MC (10MC Swp.)	83. 25MC 87. 75MC	6		A21	
			79MC (10MC Swp.)	77. 25MC 81. 75MC	5		A22	
			69MC (10MC Swp.)	67. 25MC 71. 75MC	4		A23	
			63MC (10MC Swp.)	61. 25MC 65. 75MC	3		A24	
			57MC (10MC Swp.)	55. 25MC 59. 75MC	2		A25	

VHF RF AND MIXER ALIGNMENT

Connect the negative lead of a 3 volt bias supply to the ungrounded side of C33A. Positive lead to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	207MC (10MC Swp.)	205. 25MC 209. 75MC	12	Vert. Amp. to point (E). Low side to chassis.	A26, A27, A28	Adjust for response curve similar to Fig. 7. With markers above 90%.
13.	"	"	213MC (10MC Swp.)	211. 25MC 215. 75MC	13	"		If markers fall below 70% on any channel, make compromise adjustment of A26, A27 and A28 with channel switch set to that channel. Then check all other channels to see that they have not been seriously affected.
			201MC (10MC Swp.)	199. 25MC 203. 75MC	11			
			195MC (10MC Swp.)	193. 25MC 197. 75MC	10			
			189MC (10MC Swp.)	187. 25MC 191. 75MC	9			
			183MC (10MC Swp.)	181. 25MC 185. 75MC	8			
			177MC (10MC Swp.)	175. 25MC 179. 75MC	7			
			85MC (10MC Swp.)	83. 25MC 87. 75MC	6			
			79MC (10MC Swp.)	77. 25MC 81. 75MC	5			
			69MC (10MC Swp.)	67. 25MC 71. 75MC	4			
			63MC (10MC Swp.)	61. 25MC 65. 75MC	3			
			57MC (10MC Swp.)	55. 25MC 59. 75MC	2			

IF WAVE TRAP ADJUSTMENT

The IF wave trap should be tuned to minimize interference caused by signals which fall within the video IF band-pass (40-48MC). Tune in a station on which the interference is noted and adjust A29 for minimum interference in the picture.

UHF OSCILLATOR ALIGNMENT

The UHF oscillator channel strip adjustments are reached through the same hole provided for VHF channel oscillator adjustment screws. Tune in all UHF stations available and check each one to see if the fine tuning control can be tuned through a point where clearest picture and best sound occur. If the fine tuning control does not have sufficient range on any UHF channel strip, set the fine tuning control to its mid-range position and then adjust the UHF channel strip oscillator screw for clearest picture and best sound.

UHF RF ALIGNMENT

The UHF RF portion of this tuner has been properly aligned at the factory and is very stable. Alignment of this portion of the receiver should not be required in the field.

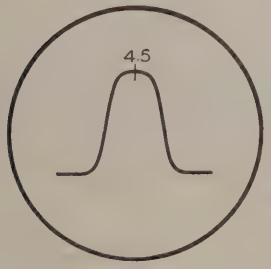


FIG. 4

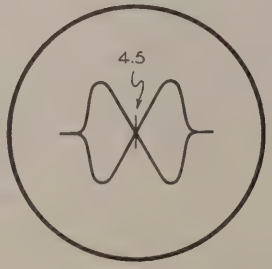


FIG. 5

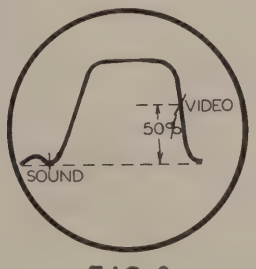


FIG. 6

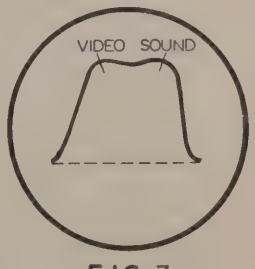
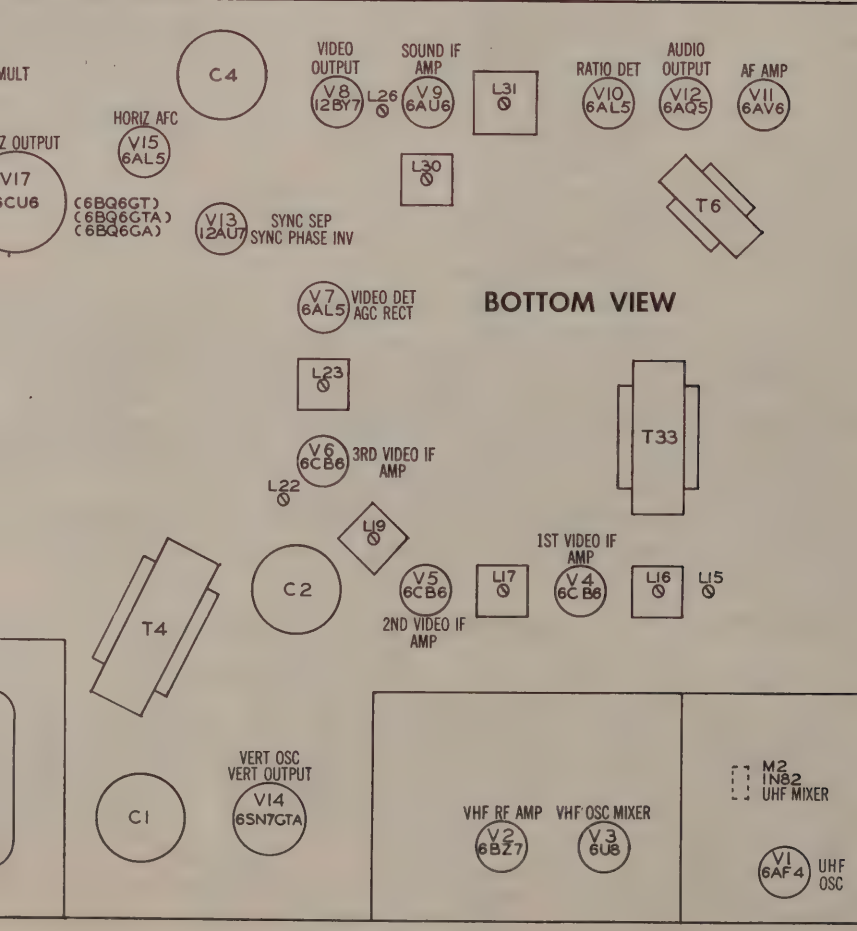


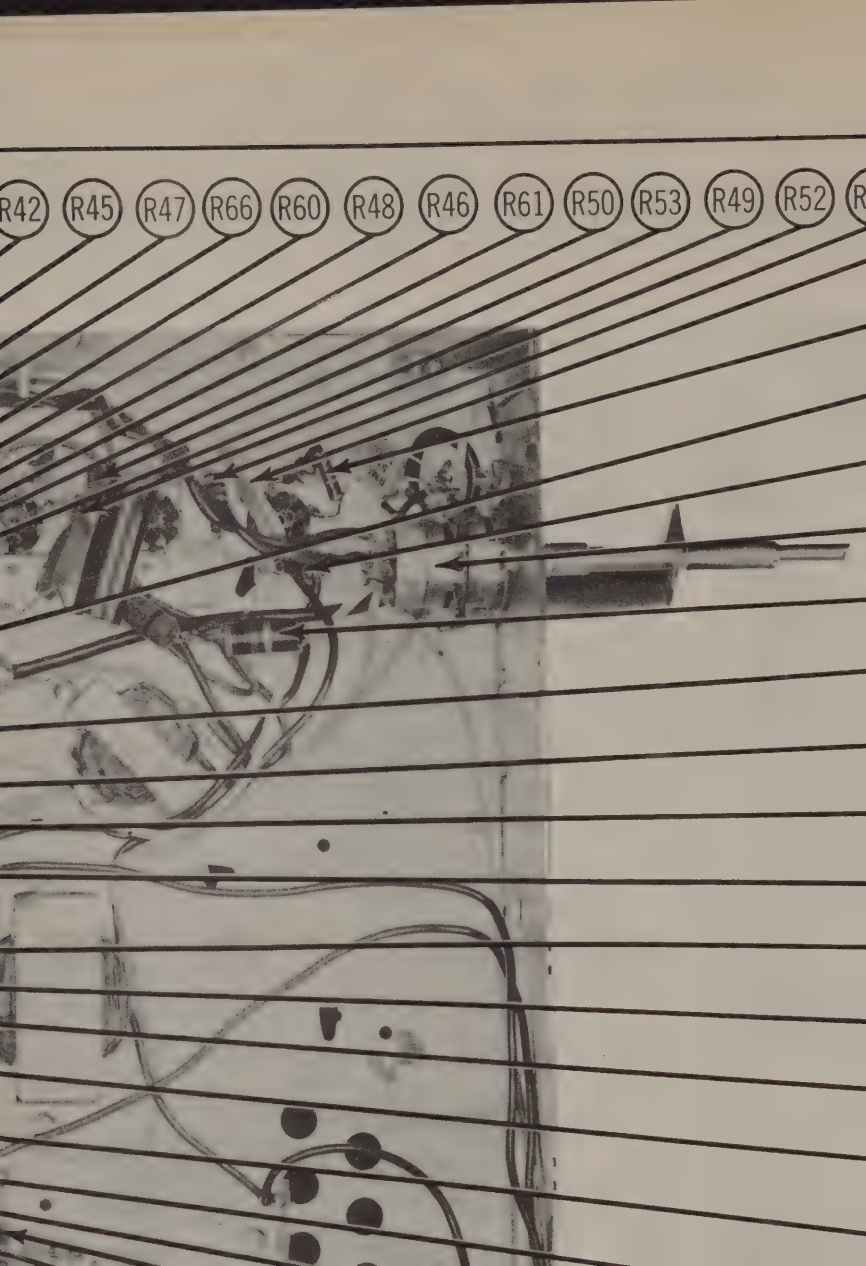
FIG. 7

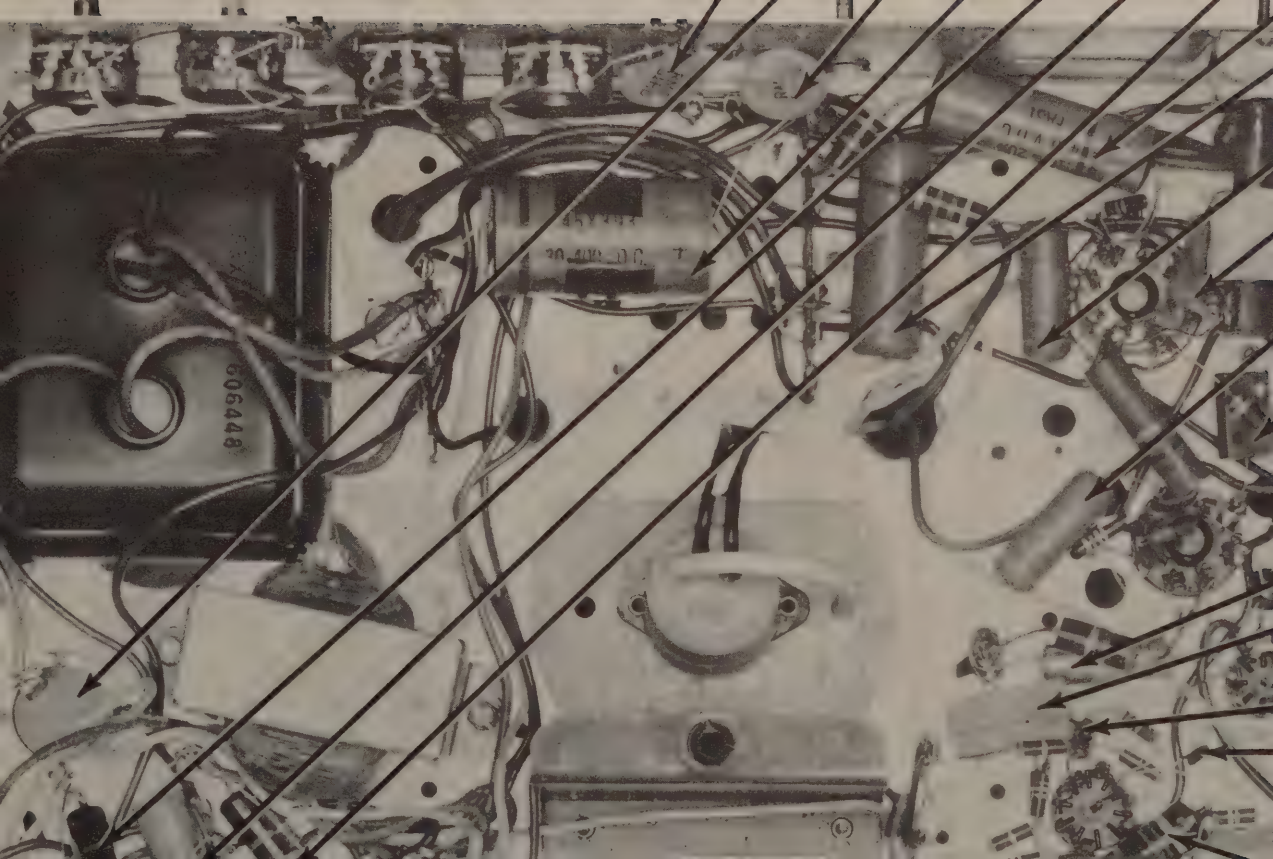
† 5.8KΩ	200KΩ	† 100KΩ	.1Ω	0Ω	† 8.2KΩ	0Ω	0Ω	10KΩ
1.5Meg	47Ω	0Ω	.1Ω	† 4.6KΩ	† 4.6KΩ	0Ω		
1.5Meg	47Ω	0Ω	.1Ω	† 4.5KΩ	† 4.5KΩ	0Ω		
.2Ω	180Ω	0Ω	.1Ω	† 3KΩ	† 3KΩ	0Ω		
900Ω	3.3KΩ	.1Ω	0Ω	.5Ω	0Ω	1Meg		
100Ω	1Meg	0Ω	.1Ω	.1Ω	0Ω	† 4KΩ	† 2.5KΩ	0Ω
56KΩ	0Ω	.1Ω	0Ω	† 3.5KΩ	† 25KΩ	0Ω		
INF	INF	.1Ω	0Ω	10KΩ	0Ω	10KΩ		
10Meg	0Ω	.1Ω	0Ω	NC	NC	† 500KΩ		
500KΩ	330Ω	0Ω	.1Ω	† 1.4KΩ	† 1KΩ	500KΩ		
† 230KΩ	1.5Meg	0Ω	0Ω	0Ω	† 6.2KΩ	† 65KΩ	2.2KΩ	.1Ω
A 2.5Meg	▲ 2.5Meg	190Ω	2.2Meg	▲ 5KΩ	2.5KΩ	0Ω	.1Ω	
4.8Meg	4.8Meg	.1Ω	0Ω	13KΩ	NC	13KΩ		
A 5Meg	† 4.4KΩ	1.5KΩ	220KΩ	† 270KΩ	1.5KΩ	.1Ω	0Ω	
NC	0Ω	TP	† 15KΩ	470KΩ	TP	.1Ω	100Ω	TOP CAP ▲ 17Ω
TP	NC	110KΩ	TP	† 44Ω	NC	.1Ω	0Ω	
	PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲ 330Ω
INF	20KΩ	INF	29Ω	INF	27Ω	INF	20KΩ	
0Ω	8.2KΩ	PIN 10 ▲ 3.3KΩ	PIN 11 † 600KΩ	PIN 12 .1Ω				

* MEASURED IN "UHF" POSITION.
† MEASURED FROM PIN 2 OF V20.
▲ MEASURED FROM PIN 3 OF V18.
TP-TIE POINT.
NC-NO CONNECTION.



TUBE PLACEMENT CHART


R42
R45
R47
R66
R60
R48
R46
R61
R50
R53
R49
R52



PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		Wells-Gardner PART No.	STANDARD REPLACEMENT		
V1	UHF Osc.	6AF4	6AF4	7DK	
V2	RF Amp.	6BZ7	6BZ7	9AJ	
V3	Mixer-Osc.	6U8	6U8	9AE	
V4	1st Video IF Amp.	6CB6	6CB6	7CM	
V5	2nd Video IF Amp.	6CB6	6CB6	7CM	
V6	3rd Video IF Amp.	6CB6	6CB6	7CM	
V7	Video Det. - AGC Rect.	6AL5	6AL5	6BT	
V8	Video Output	12BY7	12BY7	9BF	
V9	Sound IF Amp.	6AU6	6AU6	7BK	
V10	Ratio Det.	6AL5	6AL5	6BT	
V11	AF Amp.	6AV6	6AV6	7BT	
V12	Audio Output	6AQ5	6AQ5	7BZ	
V13	Sync Sep. - Sync Phase Inv.	12AU7	12AU7	9A	
V14	Vert. Osc. - Vert. Output	6SN7GTA	6SN7GTA	8BD	
V15	Horiz. AFC	6AL5	6AL5	6BT	
V16	Horiz. Mult.	6SN7GTA	6SN7GTA	8BD	
V17	Horiz. Output	6CU6	6CU6	6AM	6BQ6GT, 6BQ6GTA, or 6BQ6GA may be used.
V18	Damper	6AX4GT	6AX4GT	4CG	
V19	HV Rect.	1B3GT	1B3GT	3C	
V20	LV Rect.	5U4GA	5U4GA	5T	5U4G may be used.

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA				NOTES
	Wells-Gardner PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	
V21	21ZP4B ①	21ZP4B ①	21ZP4B ①	21ZP4B ②	
		21ZP4A	21ZP4A	21ZP4A	
				21ZP4 ③	
	21AWP4 ①	21AWP4 ①		21AWP4 ②	
	21AVP4A ①	21AVP4A ①		21AVP4A ②	
		21AVP4		21AVP4A	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	Wells-Gardner PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲80	300	45X397	AFH2-33-75	B081	FP227.6	TM-D80-350	D-175	TVL-2584
B	▲60	300							
C2A	▲80	300	45X395	AFH2-91-50	B087	FP229.8	TM-3057	T-720	TVL-3704
B	▲100	50							
C3	5	25	45X378	SRE25V5	BR550	TC30	TD-5-25	MMT-0505	TVA-1203
C4A	■10	300	45X410 (Note 1)	AFH3-137	C092	FP230.3	TM-3037	T-695	TVL-3682
B	▲40	50							
C5	30	400	45X393	PRS450V30	BR3045	TC77	TD-30-450	FM-4530	TVA-1711
C6	5	25	45X378	SRE25V5	BR550	TC30	TD-5-25	MMT-0505	TVA-1203

Note 1. Some versions use 20MFD in this application.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	Wells-Gardner PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C7A	1									
B	2									
C8	1.1									
C9	120			DI-00012	DD-121	G044	811-121	UC-5312	5GA-T12	
C10	10		13M-20A-100D-N-1							
C11	800		13M-23E801Z							
C12	800		13M-23E801Z							
C13	.5-3		31A-056-2		829-3		3115-01-0R5	CT565A		
C14	1500		13L-8XA152Z	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C15	3		13L-8C030H	NP0-SI3	TCZ-3R3	TZ07	NP0A-030	ZT-553	5TCCB-V33	
C16	.5-3		31A-056-1		829-3		3115-01-0R5	CT565A		
C17	800		13M-23E801Z							
C18	47		13L-80470K	BPD-000047	DD-470	G033	831-470	UC-5447	5GA-Q47	
C19	1.5		13L-831R5C	NP0-SI1.5	TCZ-1R5	Z004	NP0A-1R5	ZT-5515	5TCCB-V15	
C20	47		13M-20U470K		MFT-50					
C21	.5-3		31A-056-1		829-3		3115-01-0R5	CT565A		
C22	.5-3		31A-056-1		829-3		3115-01-0R5	CT565A		
C23	10		13L-8U100F	N750-DI10	TCN-10	N018	N750K-100	NT-541	5TCU-Q1	
C24	5		13L-8UA050C							
C25	1500		13L-8XA152Z	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C26	220		13L-12D221K	DI-00022	DD-221	G051	811-221	UC-5322	5GA-T22	
C27	800		13M-23E801Z							
C28	800		13M-23E801Z							
C29	800		13M-23E801Z							
C30	1500		13L-8XA152Z	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C31	36		47X627							
C32	47		47X603	SI47	D6-470	TP29	GP1K-470	UC-5447	5GA-Q47	
C33A	1000		80X3	BPD-2X001	DD2-102	DK069	812-001	DCD-521	5HK-2D1	
B	1000									
C34	680		80X5	BPD-00068	DD-681	K065	811-681	UC-5368	5GA-T68	
C35	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C36A	1000		80X3	BPD-2X001	DD2-102	DK069	812-001	DCD-521	5HK-2D1	
B	1000									
C37	680		80X5	BPD-00068	DD-681	K065	811-681	UC-5368	5GA-T68	
C38	1.5		47X584	NP0-SI1.5	TCZ-1R5	TZ04	NP0A-1R5	ZT-5515	5TCCB-V15	Note 2
C39	150	500	RCM15E151K	NP0-SI150	D6-151	22R5T15	811-151	MCB236	MS-315	
C40	680		80X5	BPD-00068	DD-681	K065	811-681	UC-5368	5GA-T68	Note 3
C41	470		80X4	BPD-00047	DD-471	K060	831-471	UC-5347	5GA-T47	
C42	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C43	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C44	15		47X605	SI15	D6-150	TP11	GP1K-150	UC-5415	5GA-Q15	
C45	.22	200	RCP10M2224M	P288N-22		CUB2P22		PT4022	2TM-P22	

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	Wells-Gardner PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C46	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C47	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C48	5		47X562	NPO-SI5	TCZ-4R7	Z011	NP0A-050	ZT-555	5TCCB-V47	
C49	5		57X562	NPO-SI5	TCZ-4R7	Z011	NP0A-050	ZT-555	5TCCB-V47	
C50	.047	200	RCP10M2473M	BPD-05	DF-503	CUB2S47		PT4147	2TM-S47	
C51	30		47X669	1469-00003		Z028			MS-43	
C52	.1	400	RCP10M4104M	P488N-1	DF-104	CUB4P1		PT401	4TM-P1	
C53	1.5		47X584	NPO-SI1.5	TCZ-1R5	Z004	NP0A-1R5	ZT-5515	5TCCB-V15	
C54	100		47X604	SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C55	5000		47X507	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C56	5000		47X507	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C57	330	500	47X570	1469-00033	D6-331	5R5T33	811-331		MS-333	
C58	470	500	47X525	1464-00047	D6-471	5R5T47	GP2K-471	MC245	MS-347	
C59	.047	200	RCP10M2473M	BPD-05	DF-503	CUB2S47		PT4147	2TM-S47	
C60	5000		47X507	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C61A	10000									
B	250		†76X5	†PA112-3	†PC-80	†113TM1	†1404-01		†T-1	
C										
C62	.0047	600	RCP10M6472M	BPD-0047	D6-472	K079	GP2-333-472	PT6247	6TM-D47	
C63	330	500	47X570	1469-00033	D6-331	5R5T33	811-331	UC-5333	MS-333	
C64	.01	400	RCP10M4103M	BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C65	.047	400	RCP10M4473M	BPD-05	DF-503	CUB4S47		PT4147	4TM-S47	
C66A	2000							DC-522		
B	5000		♦76X7	♦PA-110	♦PC-100	♦115TM1	♦1405-01	DC-525	♦V-1	
C	5000							DC-525		
C67	.01	400	RCP10M4103M	BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C68	.022	200	RCP10M2223M	BPD-02	DF-203	CUB4S22	817-02	PT4122	2TM-S22	
C69	.047	600	RCP10M6473M	BPD-05	DF-503	CUB6S47		PT6147	6TM-S47	
C70	.022	200	RCP10M2223M	BPD-02	DF-203	CUB4S22	817-02	PT4122	2TM-S22	
C71	.1	600	RCP10M6104M	P688N-1	DF-104	CUB6P1		PT601	6TM-P1	
C72	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C73	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C74	.01	400	RCP10M4103M	BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C75	.0047	400	RCP10M4472M	BPD-0047	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C76	.047	200	RCP10M2473M	BPD-05	DF-503	CUB2S47		PT4147	2TM-S47	
C77	4700	500	47X543	1464-0047		IR5D47		MCE465	MS-247	
C78	430	500	RCM20B431K			5R5T33			MS-343	
C79	.047	400	RCP10M4473M	BPD-05	DF-503	CUB4S47		PT4147	4TM-S47	
C80	330	500	47X570	1469-00033	D6-331	5R5T33	811-331		MS-333	
C81	.047	400	RCP10M4473M	BPD-05	DF-503	CUB4S47		PT4147	4TM-S47	
C82	.1	400	RCP10M4104M	P488N-1	DF-104	CUB4P1		PT401	4TM-P1	
C83	.15	400	RCP10M4154M	P488N-15		CUB4P15		PT4015	4TM-P15	
C84	10000	1000	47X615	DAC-27					10HKB-S1	
C85	10000	1000	47X615	DAC-27					10HKB-S1	

Note 2. Some versions use 1MMF in this application.
Note 3. Some versions use 470MMF in this application (part #80X4).
† Items C61A, C61B, C61C, R55A and R55B are combined in one unit.
When replacing items separately C61B and C61C should total 250MMF.
♦ Items C66A, C66B, C66C, R68A, R68B and R68C are combined in one unit.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	Wells-Gardner PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1000Ω	½	78X21	F1-4	RTV-502	QJ-638 ♦	UF13L	Contrast (Panel)
B	1Meg			R2-59			UR16-T254	Volume (Rear)
C	Switch			KB-2			US-27	Attach to R1B.
R2A	500KΩ	½	40X385	BX-59	A47-500K-S	Q11-133	TA55L	Brightness
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R2A.
R3A	1.5Meg	½	40X386	BX-742	A47-1.5Meg-S	Q11-138	TA155L	Vertical Hold
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R3A.
R4A	2.5Meg	½	40X369A	AB-83	A47-2.5Meg-S	Q11-239	TA255L	Height
B	Shaft		Not Req.	AK-1	FKS-1/4	Not Req.	Not Req.	Attach to R4A.
R5A	8000Ω	½	40X375	AB-14	A47-10K-S	Q11-116	TA14L	Vertical Linearity
B	Shaft		Not Req.	AK-1	FKS-1/4	Not Req.	Not Req.	Attach to R5A.

♦ Concentrikit Equivalent; K-4 Kit, Base Elements and Shafts; B11-108, P6-218 (Panel)
B13-137X, R16-313 (Rear)
76-2 (Switch)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	Wells-Gardner PART No.	IRC PART No.	NOTES
R6	10KΩ	½	12T-AE103M		
R7	1000Ω	½	12T-AE102K	BTS-1000	
R8	100Ω	½		BTS-100	
R9	47KΩ	½	12T-AE473M	BTS-47K	
R10	22KΩ	½	12T-AE223K	BTS-22K	
R11	270KΩ	½	12T-AE274K	BTS-270K	
R12	180KΩ	½	12T-AE184K	BTS-180K	
R13	680Ω	½	12T-AE681K	BTS-680	
R14	3300Ω	1	12S-AE332K		
R15	33KΩ	½	12T-AE333M		
R16	10KΩ	½	12T-AE103M		
R17	3300Ω	½	12T-AE472K		
R18	6800Ω	½			
R19	100KΩ	½	12T-AE104K		
R20	100KΩ	½	12T-AE104K		
R21	100KΩ	½	12T-AE104K		
R22	8200Ω	½	12T-AE822K		
R23	1000Ω	½	B85102	BTS-1000	
R24	3300Ω 5%	½	B83332		
R25	470Ω	½	B85471	BTS-470	
R26	47Ω 5%	½	B83470	BTS-47 5%	
R27	150Ω	½	B85151	BTS-150	
R28	39KΩ 5%	½	B83393		
R29	470Ω	½	B85471	BTS-470	
R30	47Ω 5%	½	B83470	BTS- 47 5%	
R31	4000Ω	5	43X288	PW7-4000	
R32	39KΩ 5%	½	B83393		
R33	470Ω	½	B85471	BTS-470	Note 1
R34	180Ω	½	B84181	BTS-180	
R35	470KΩ	½	B85474	BTS-470K	
R36	1Meg	½	B84105	BTS-1Meg	
R37	47KΩ	½	B84473	BTS-47K	
R38	3300Ω 5%	½	B83332	BTS-3300 5%	
R39	1Meg	½	B84105	BTS-1Meg	
R40	2000Ω 5%	2	D83202	BTB-2000 5%	
R41	2000Ω 5%	2	D83202	BTB-2000 5%	
R42	47Ω	½	B84470	BTS-47	
R43	8200Ω	½	B84822	BTS-8200	
R44	3300Ω	1	C84332	BTA-3300	
R45	470KΩ	½	B84474	BTS-470K	

ITEM No.	RATING OHMS	RATING WATT	Wells-Gardner PART No.	IRC PART No.	NOTES
R46	56KΩ	½	B84563	BTS-56K	
R47	33KΩ	½	B84333	BTS-33K	
R48	33KΩ	½	B84333	BTS-33K	Note 2
R49	1000Ω	½	B85102	BTS-1000	
R50	270Ω	½	B84271	BTS-270	
R51	150KΩ	½	B84154	BTS-150K	
R52	10KΩ 5%	½	B83103	BTS-10K 5%	
R53	10KΩ 5%	½	B83103	BTS-10K 5%	
R54	10Meg	½	B85106	BTS-10Meg	
R55A	500KΩ	½	† 76X5	BTS-470K	
B	500KΩ	½		BTS-470K	
R56	1000Ω	2	D84102	BTB-1000	
R57	330Ω	1	C84331	BTA-330	
R58	10KΩ	½	B84103	BTS-10K	
R59	150KΩ	½	B84154	BTS-150K	
R60	1.5Meg	½	B84155	BTS-1.5Meg	
R61	270KΩ	½	B84274	BTS-270K	
R62	820KΩ	½	B84824	BTS-820K	
R63	47KΩ	½	B84473	BTS-47K	
R64	1Meg	½	B84105	BTS-1Meg	
R65	22000Ω 5%	½	B83222	BTS-2200 5%	
R66	1500Ω	½	B84152	BTS-1500	Note 3
R67	22000Ω 5%	½	B83222	BTS-2200 5%	
R68A	22KΩ	½		BTS-22K	
B	8200Ω	½	♦ 76X7	BTS-8200	
C	8200Ω	½		BTS-8200	
R69	22KΩ	½	B84223	BTS-22K	
R70	1.5Meg	½	B84155	BTS-1.5Meg	Note 4
R71	22KΩ	½	B84223	BTS-22K	
R72	2.2Meg	½	B84225	BTS-2.2Meg	
R73	1.8Meg	½	B84185	BTS-1.8Meg	
R74	820Ω	½	B84821	BTS-820	
R75	2.2Meg	½	B84225	BTS-2.2Meg	
R76	120KΩ	½	B84124	BTS-120K	Note 5
R77	560Ω	½			
R78	100KΩ	½	B84104		
R79	4.7Meg	½	B85475		
R80	27KΩ	½	B84273		
R81	18KΩ	1	C84183		
R82	100KΩ	½	B84104		

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA Wells-Gardner PART No.	IRC PART No.
R83	470KΩ	½	B85474	
R84	4300Ω 5%	1	C83432	
R85	220KΩ	½	B84224	
R86	220KΩ	½	B84224	
R87	47KΩ	1	C84473	
R88	47KΩ	½	B84473	
R89	8200Ω	½	B84822	
R90	1500Ω	½	B83152	
R91	470KΩ	½	B84474	

Note 1. Some versions u
Note 2. Some versions u
Note 3. Some versions u
Note 4. Some versions u
Note 5. Some versions u
Note 6. Some versions u
Note 7. Used only in mo
† Items C61A, C61B, C6
♦ Items C66A, C66B, C6

TRANS

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	Wel
T1	117VAC ② 1.4A	516VCT . 230ADC	5VAC ③ 3A	6.3VAC ④ 8.3A	53

① Tape 6.3V ③ 1.2A winding.
② Parallel and phase 6.3V windings for secondary #

TRANSFORM

ITEM No.	USE	Wells-Gardner PART No.	Halldorso PART No
T2	Vert. Osc. Trans.	54X10	B6702
T3	Horiz. Output Trans.	53X342 ②	FB440 •
		53X347 ② ③	FB440 •
T4	Vert. Output Trans.	51X168	Z1806 ①
T5A	Yoke-Horiz. (13.5MH)	9A2334-1 ②⑤	DF602 ⑥
B	Vert. (46MH)	9A2334-3 ③ ⑤	DF602 ⑥ ⑦
		2A435 ③ ④	

① Drill new mounting hole(s).
② Used in models 321AM58 series.
③ Used in models 321AS58 series.
④ Yoke rear cover and centering device.
⑤ Includes resistor R77.
⑥ Use original yoke damping network.
⑦ Use original yoke rear cover and centering devic

*HORIZONTAL OUTPU

Use Original Wid

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections
	6	13	6
	5	Jumper 10 & 11	5
	4	6	4
	3	5	3
	1	1 or 2	1
	A	9	A
	G	8	G
Special Notes →			

⑨ No connection to trans. connect a damping capacit
yoke terms #3 & #7.
⑩ Jumper terms #9 & "T".

TRANSFORME

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	Wells-Gardner PART No.	Halldorson PART No.	REPLACEM Meri PART N
T6	4.75KΩ	3.3Ω	51X167	Z1107	A-3026

S

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	Wells-Gardner PART No.	REPLACE PA
SP1	8"	PM	3.3Ω	12A522	8A
	6"	PM	3.3Ω	12A516 ①	6A

CO

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	Wells-Gardner PART No.
L1	UHF Ant. Coil	0Ω		31K-137-04
L2	UHF Ant. Coil	0Ω		31K-137-06
L3A	UHF Ant., Mixer, Osc. Coils	0Ω		9A2331-10
B	UHF Ant., Mixer, Osc. Coils	0Ω		9A2331-20
C	UHF Ant., Mixer, Osc. Coils	0Ω		9A2331-30
D	UHF Ant., Mixer, Osc. Coils	0Ω		9A2331-40

IPTIONS (Continued)

(cont)

EM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA Wells-Gardner PART No.	REPLACEMENT DATA IRC PART No.	NOTES
2	68Ω	½	B85680		
3	15KΩ	2	D84153		Note 6
4	100Ω	2	D84101		
5	5600Ω	½	B84562		
6	2.2Ω	½	43X322	BW½-2.2	
7	2500Ω	10	43X287	PW10-2500	
8	100KΩ	2	D85104	BTB-100K	
9	270KΩ	½	B85274	BTS-270K	
00	100KΩ	½	B84104	BTS-100K	Note 7

istor in this application.
sistor in this application.
sistor in this application.
esistor in this application.
sistor in this application.
sistor in this application.
A or 21AUP4A picture tube.
re combined in one unit.
R68C are combined in one unit.

POWER)

REPLACEMENT DATA Halldorson RT No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
	P-2837 ①			R-44BS②

EP CIRCUITS)

REPLACEMENT DATA RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1 ①	V405	A-8125	26A03	A-97X
T1 * ①	X110 *	A-8264 *	FLY-37 *	D-35 * ①
T1 * ①	X110 *	A-8264 *	FLY-37 *	D-35 * ①
T1 ①	V312 ①	A-8141 ①	26S54 ①	A-104X ①
02 ⑥	Y70F14 ⑥	DY-9A ⑥	Y-4 ⑥	Y-17 ⑥
02 ⑥ ⑦	Y70F14 ⑥ ⑦	DY-9A ⑥ ⑦	Y-4 ⑥ ⑦	Y-17 ⑥ ⑦

MER CONNECTION DATA

acement Type Is Listed

Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
13	6	13	10
Jumper 10 & 11	5	Jumper 10 & 11	8
6	4	6	6
5	3	5	See Note ⑨
1 or 2	2	1 or 2	3
9	A	9	1
8	G	8	2
			⑨ ⑩

8MMF ⑨ 2KV) in series with R77, across horiz.

O OUTPUT)

Thordarson PART No.	Triad PART No.	NOTES
24S51	S-6X	

CA No.	NOTES
2	① Alternate speaker used on some versions.
1	

NT DATA)

MERIT PART No.	MILLER PART No.	NOTES
		Channels 14 thru 19
		Channels 20 thru 29
		Channels 30 thru 39
		Channels 40 thru 49

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA Wells-Gardner PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
E	UHF Ant., Mixer, Osc. Coils	0Ω		9A2331-50				Channels 50 thru 59
F	UHF Ant., Mixer, Osc. Coils	0Ω		9A2331-60				Channels 60 thru 69
G	UHF Ant., Mixer, Osc. Coils	0Ω		9A2331-70				Channels 70 thru 79
H	UHF Ant., Mixer, Osc. Coils	0Ω		9A2331-80				Channels 80 thru 83
L4	RF Choke	0Ω						
L5A	Fil. Choke	0Ω						
B	Fil. Choke	0Ω		31K-137-07				
L6	UHF IF Coil							
L7	RF Choke							
L8	Cathode Choke	0Ω		31K-137-02				
L9	UHF IF Input Coil	0Ω	.1Ω					
L10	UHF IF Interstage	.2Ω						
L11	UHF IF Interstage	.3Ω	.1Ω					
L12A	VHF Ant. Coil	0ΩCT	0Ω	9A2329-2				Channel 2
B	VHF Ant. Coil	0ΩCT	0Ω	9A2329-3				Channel 3
C	VHF Ant. Coil	0ΩCT	0Ω	9A2329-4				Channel 4
D	VHF Ant. Coil	0ΩCT	0Ω	9A2329-5				Channel 5
E	VHF Ant. Coil	0ΩCT	0Ω	9A2329-6				Channel 6
F	VHF Ant. Coil	0ΩCT	0Ω	9A2329-7				Channel 7
G	VHF Ant. Coil	0ΩCT	0Ω	9A2329-8				Channel 8
H	VHF Ant. Coil	0ΩCT	0Ω	9A2329-9				Channel 9
I	VHF Ant. Coil	0ΩCT	0Ω	9A2329-10				Channel 10
J	VHF Ant. Coil	0ΩCT	0Ω	9A2329-11				Channel 11
K	VHF Ant. Coil	0ΩCT	0Ω	9A2329-12				Channel 12
L	VHF Ant. Coil	0ΩCT	0Ω	9A2329-13				Channel 13
L13	Neut. Coil	0Ω						
L14A	VHF RF Mixer Grid, Osc. Coils	0Ω		9A2330-2				Channel 2
B	VHF RF, Mixer Grid, Osc. Coils	0Ω		9A2330-3				Channel 3
C	VHF RF, Mixer Grid, Osc. Coils	0Ω		9A2330-4				Channel 4
D	VHF RF, Mixer Grid, Osc. Coils	0Ω		9A2330-5				Channel 5
E	VHF RF, Mixer Grid, Osc. Coils	0Ω		9A2330-6				Channel 6
F	VHF RF, Mixer Grid, Osc. Coils	0Ω		9A2330-7				Channel 7
G	VHF RF, Mixer Grid, Osc. Coils	0Ω		9A2330-8				Channel 8
H	VHF RF, Mixer Grid, Osc. Coils	0Ω		9A2330-9				Channel 9
I	VHF RF, Mixer Grid, Osc. Coils	0Ω		9A2330-10				Channel 10
J	VHF RF, Mixer Grid, Osc. Coils	0Ω		9A2330-11				Channel 11
K	VHF RF, Mixer Grid, Osc. Coils	0Ω		9A2330-12				Channel 12
L	VHF RF, Mixer Grid, Osc. Coils	0Ω		9A2330-13				Channel 13
L15	Fil. Choke	0Ω		34A-575				
L16	Conv. Plate	.1Ω		31K-264				
L17	IF Trap	.1Ω		9A2320				
L18	1st Video IF	.1Ω		9A2316				
L19	2nd Video IF	.2Ω	.2Ω	9A2317		TV-128	6218	Includes 47.25MC Trap
L20	Fil. Choke	0Ω		9A2033	19-1002		4606	2.2 Microhenries
L21	3rd Video IF	.2Ω	.2Ω	9A2318	17-5003 *	TV-128 *	6233 *	
L22	Parasitic Suppressor	0Ω		9A2322				1 turn wire wound on 10Ω resistor
L23	Fil. Choke	0Ω		9A2033	19-1002		4606	2.2 Microhenries
L24	Cathode Trap	0Ω	0Ω	9A2321				
L25	4th Video IF	.5Ω	.5Ω	9A2319	17-5004	TV-125	6234	
L26	Series Peaking Coil	7.5Ω		36A30	19-3075		4630	60 Microhenries
L27	Series Peaking Coil	10Ω		36A1	19-3100	TV-181	6177	100 Microhenries
L28	4.5MC Trap	3.3Ω		9A2336	20-1004	TV-151	1469	
L29	Series Peaking Coil	20Ω		36A28	19-3300 ■	TV-190 ■	6155 ■	350 Microhenries; Wound on 6.8KΩ resistor
L30	Shunt Peaking Coil	15Ω		36A29	19-3180 ▲	TV-184 ▲	6154 ▲	190 Microhenries; Wound on 2.7KΩ resistor
L31	Series Peaking Coil	10Ω		36A1	19-3100	TV-181	6177	100 Microhenries
L32	Sound IF	2.2Ω		9A2201	17-1031 ▲	TV-113 ♦	6203 ♦	
L33	Ratio Det.	4.2Ω	.7ΩCT	9A2295	17-3497	TV-115	6205	Tertiary Winding=.4Ω

* Detune trap.
■ Parallel with 6.8KΩ resistor.
▲ Parallel with 2.7KΩ resistor.
▲ Drill mounting holes.
♦ Use one winding only.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA Wells-Gardner PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No.	Ram PART No.	Thordarson PART No.	NOTES
L34	68Ω		9A2273	19-1576	TV-163	6210			HS-5	

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D.C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA Wells-Gardner PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L35	.230A	39.6Ω	1.06HY	52X95	C5037 ①	C-2996 ①	C-2326 ①	26C44	C-23X ①

① Drill one new mounting hole.

PARTS LIST AND DESCRIPTIONS (Continued)

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			Wells-Gardner PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B	4/10A 125V	16X147-3	16X146	313.400 (3AG S/B 4/10A)	357001	MDL 4/10	4405

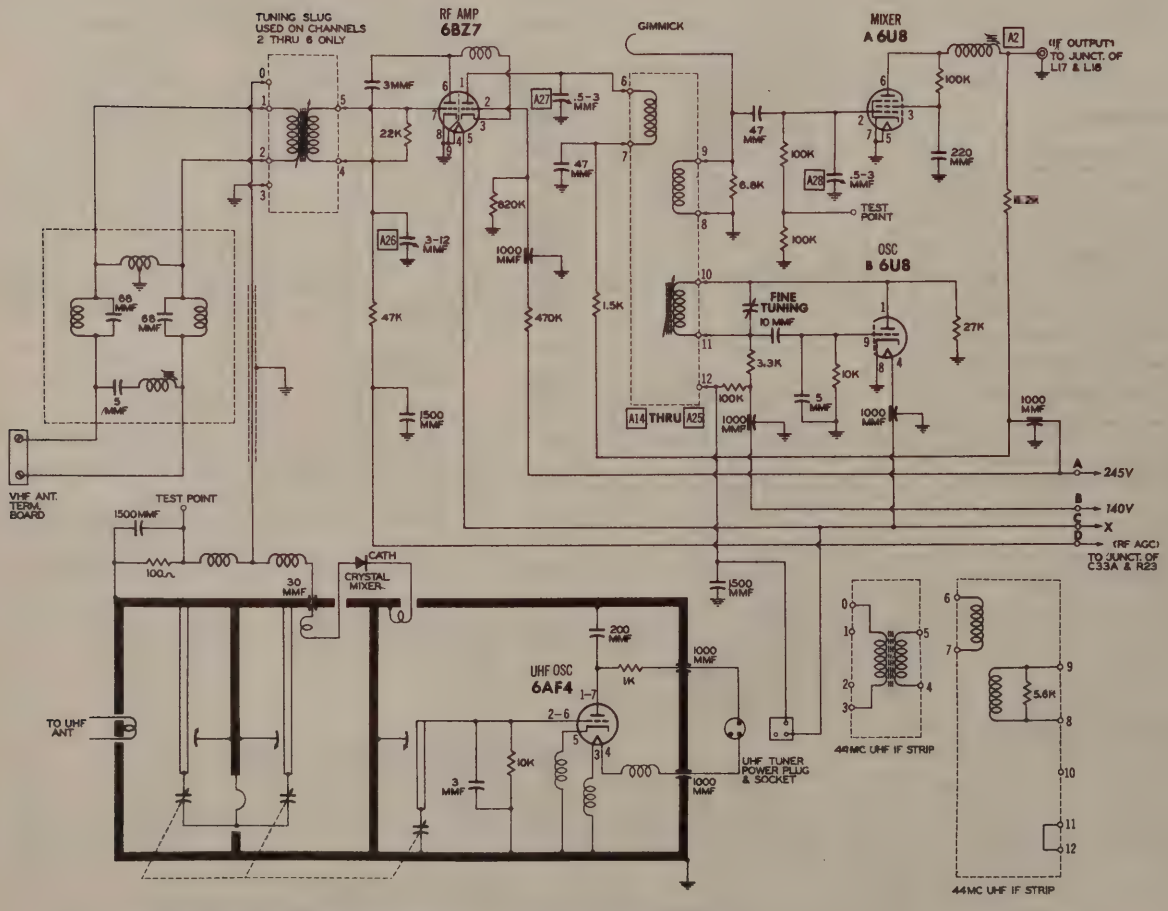
CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA		NOTES
		Wells-Gardner PART No.	SYLVANIA PART No.	
M2	1N82A *	31K-111	1N82 or 1N82A	UHF Mixer

* Some versions may use type 1N82 crystal diode in this application.

MISCELLANEOUS

ITEM No.	PART NAME	Wells-Gardner PART No.	NOTES
M3	Dial Light	7A32	#51
M4	Tuner	25A1124	VHF-UHF-Model 321AM58 Series
	Tuner	25X1128	VHF-UHF-Model 321AM58 Series
	Tuner	25A1128	VHF-UHF-Model 321AS58 Series
M5	Trap	31K-225	VHF antenna input filter-Model 321AM58 Series
	Trap	31K-225-03	VHF antenna input filter-Model 321AS58 Series :58A
M6	Focus Magnet	2A438-3	Includes centering device-Model 321AM58 Series 1-AM54A
M7	Centering Device	2A435	Model 321AS58 Series, Includes deflection yoke (T5)
			Rear Cover
M8	Ion Trap	2A421	
B1	Trimmer Cap.	17A269	Horiz. Drive (120-400MMF)



UHF-VHF TUNER PART NO.25A1128 USED IN MODEL 321AS58 SERIES

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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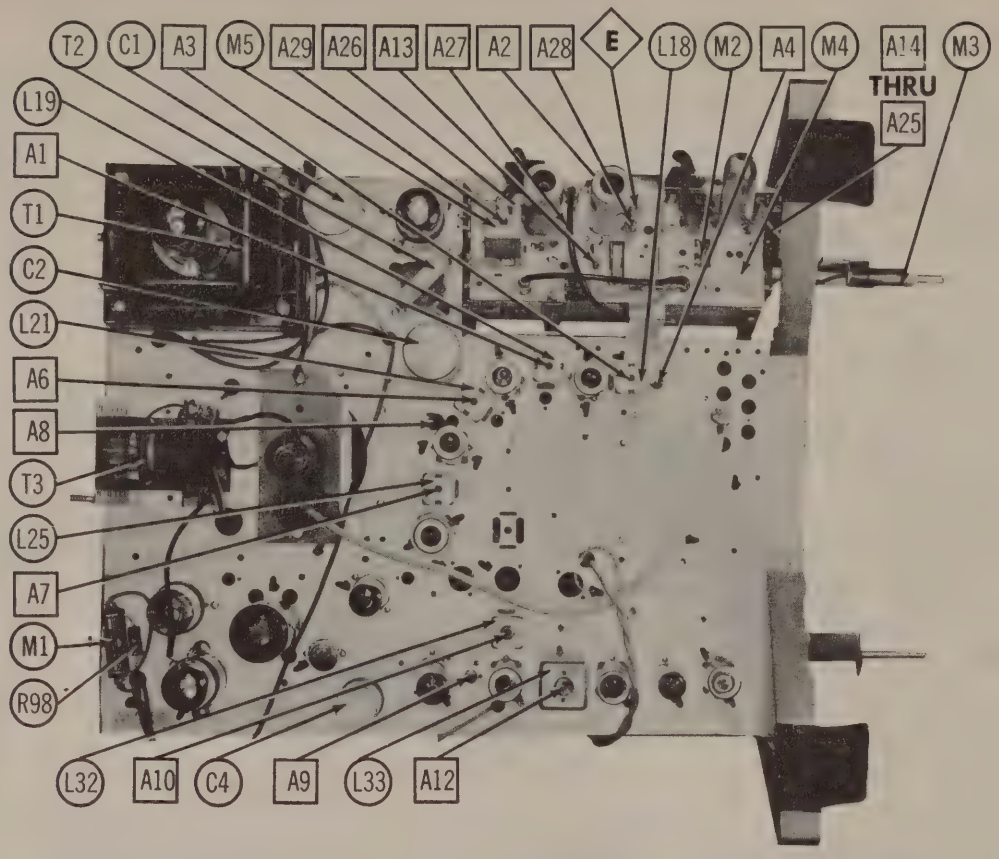
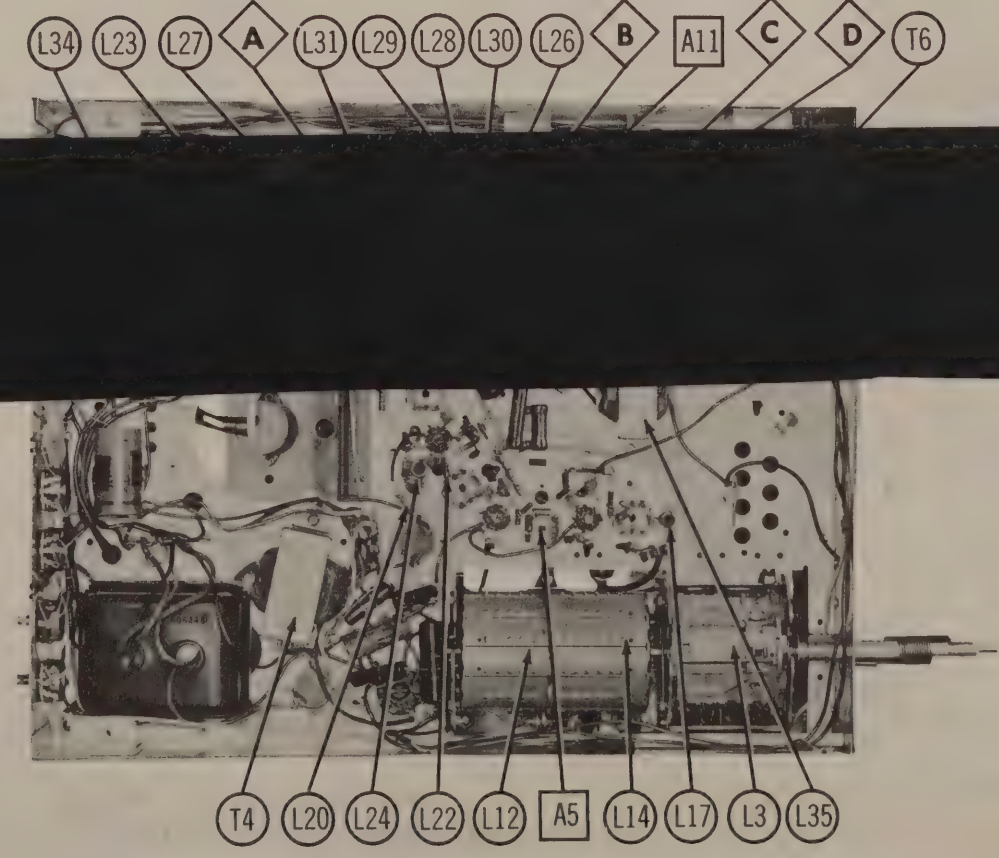
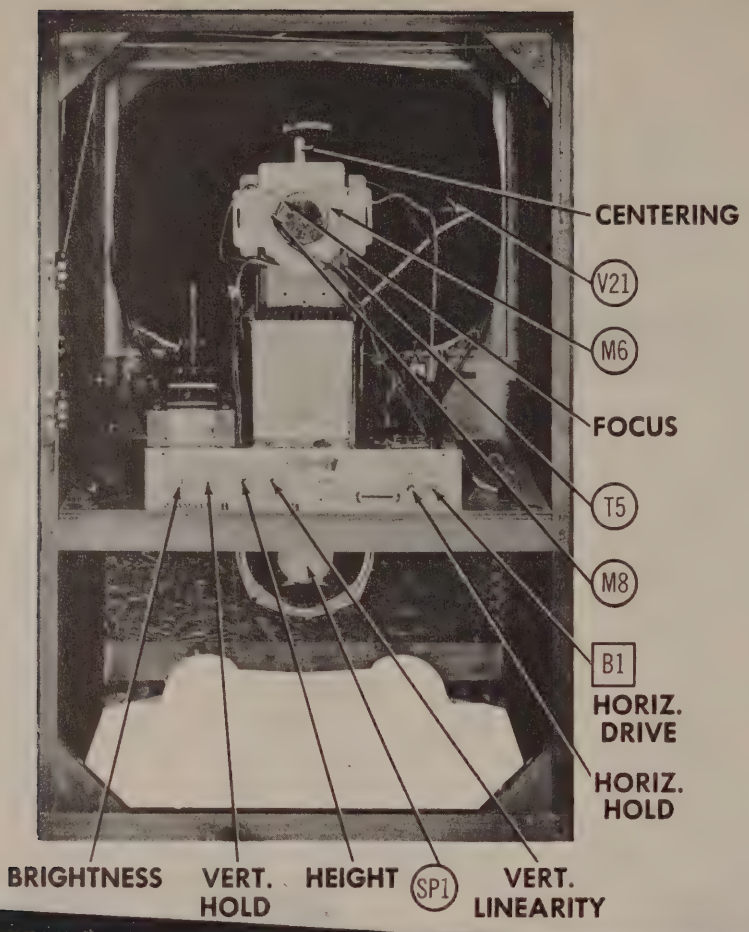
ALTERNATE TUNER SCHEMATIC

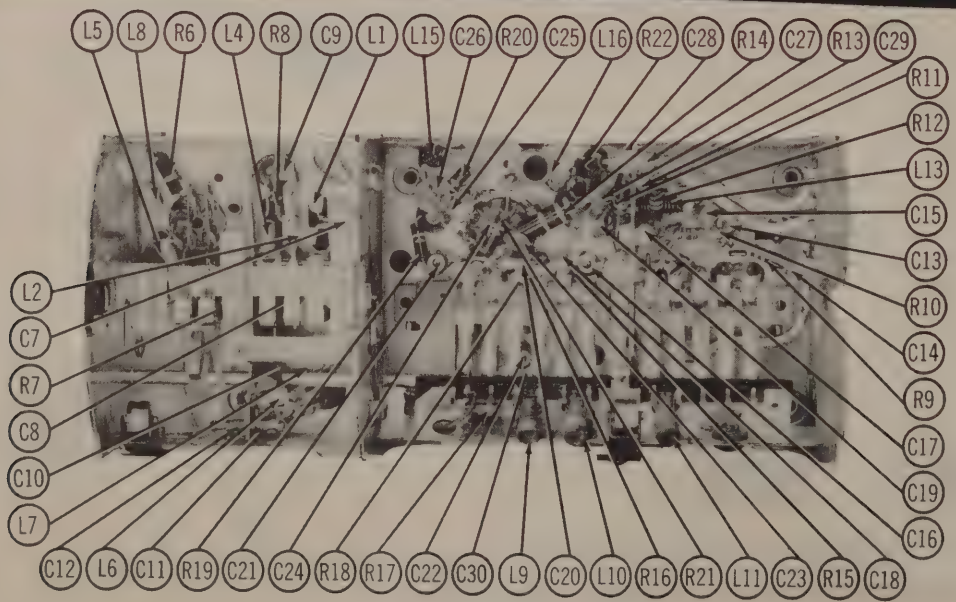


CHASSIS TOP VIEW



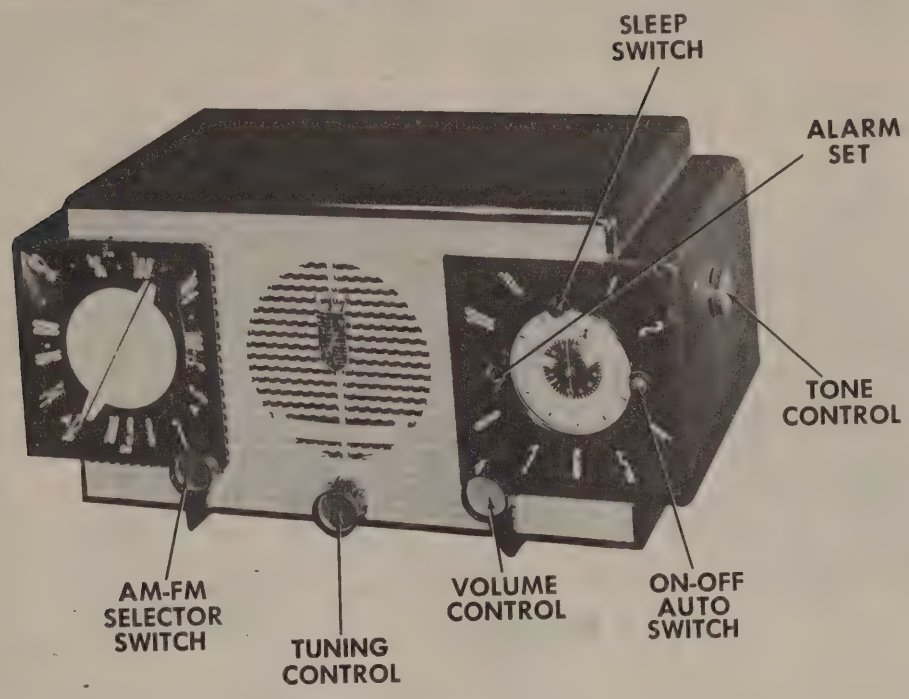
CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENT.



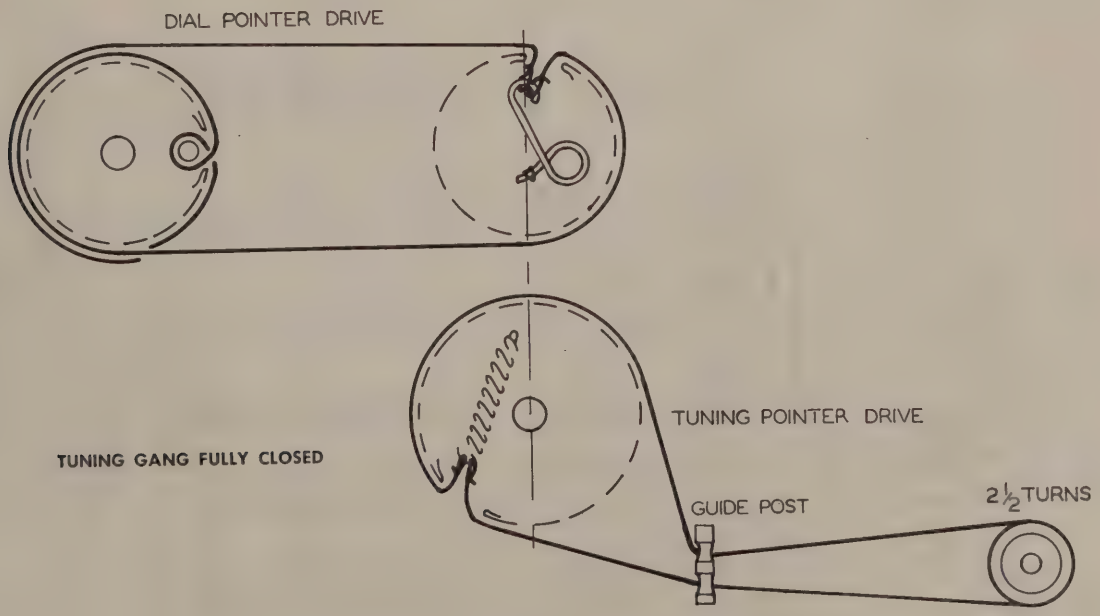


TUNER BOTTOM VIEW

ZENITH MODELS X733G, R, Y (Ch. 7X03)



TRADE NAME	Zenith Models X733G, R, Y (Ch. 7X03)
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago 39, Ill.
TYPE SET	AC Operated AM-FM Superheterodyne Receiver With Electric Clock
TUBES (Seven)	Types 12BA6 FM RF Amp., 12AT7 AM-FM Mixer-Osc., 12BA6, 1st AM-FM IF Amp., 12BA6 2nd AM-FM IF Amp., 12AU6 Limiter, 19T8 Discriminator-AM Det. -AVC-AF Amp., 35C5 Output
POWER SUPPLY	110-120 Volts AC - 60 Cycles
RATING	.30 Amp. @117 Volts AC
TUNING RANGE—BROADCAST	540KC - 1620KC
FREQ. MOD.	88MC - 108MC



DIAL CORD STRINGING

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DENVER, COLORADO

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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ITEM No.	USE	REPLACEMENT DATA		NOTES
		ZENITH PART No.	STANDARD REPLACEMENT	
V1	FM RF Amplifier	12BA6	12BA6	
V2	FM-AM Mixer - Osc.	12AT7	12AT7	
V3	1st FM-AM IF Amp.	12BA6	12BA6	
V4	2nd FM-AM IF Amp.	12BA6	12BA6	
V5	Limiter	12AU6	12AU6	
V6	Discriminator - AM Det. - AVC-AF Amplifier	19T8	19T8	
V7	Output	35C5	35C5	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	ZENITH PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	■80	150	22-2399	AFH3-13	C012	FP311.55	TM-804020-150	T-055	TVL-3437
B	▲20	150				TC47			TVA-1413
C	20	150							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

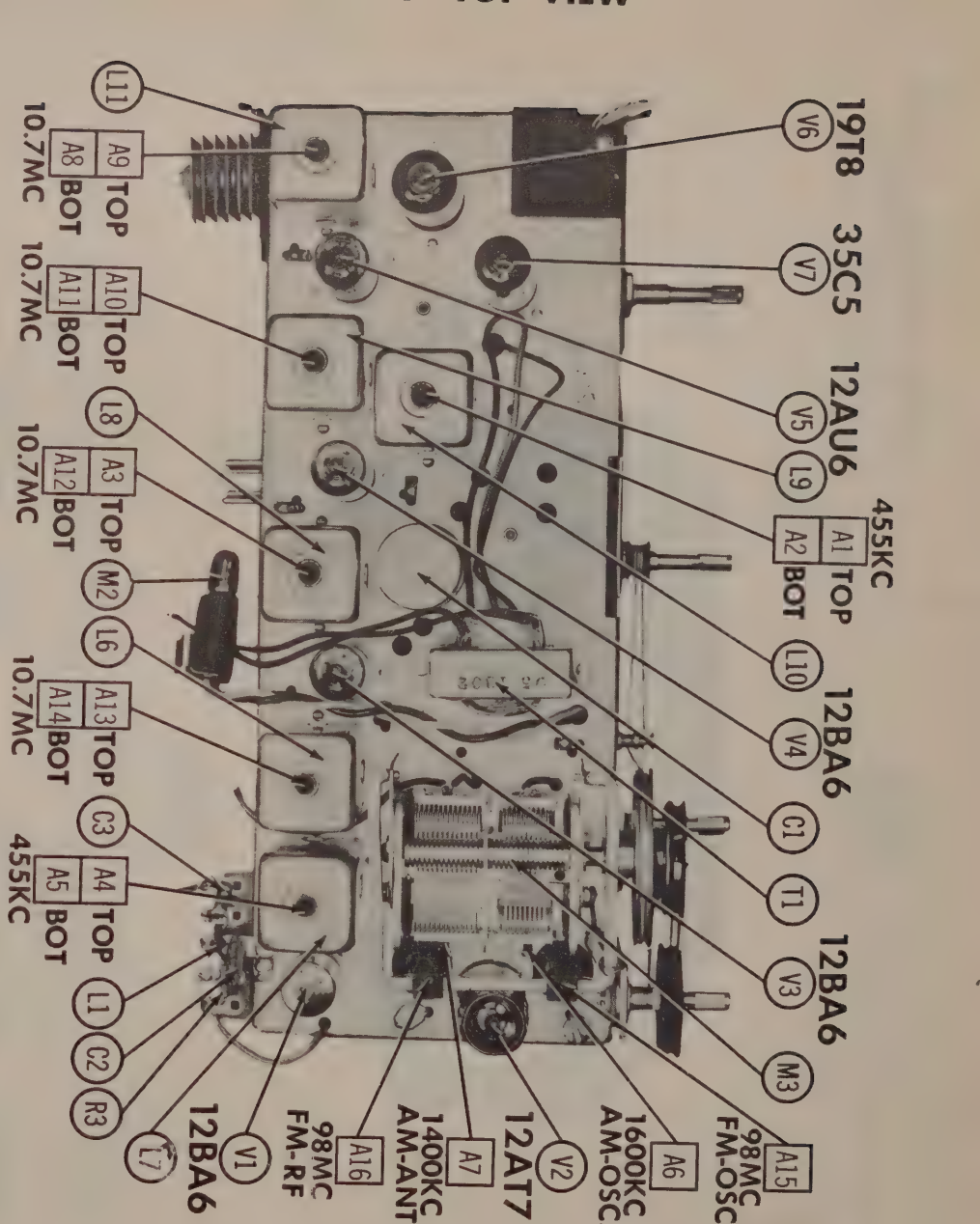
ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	ZENITH PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	10000		22-3	BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C3	7.5		22-1852							
C4	100		22-5	BPD-0001	DD-101	G042	801-101	UC-531	5GA-T1	
C5	1000		22-1676	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C6	1000		22-1676	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C7	22		22-1506	SI22	D6-220	TP22	GP1K-220	UC-5422	5GA-Q22	
C8	.05	200	22-829	BPD-05	DF-503	CUB2S5		PT415	2TM-S5	
C9	.68		22-1766		TCZ-R68	TZ02	NP0A-0R68	ZT-5675		
C10	22		22-1506	SI22	D6-220	TP22	GP1K-220	UC-5422	5GA-Q22	
C11	10000		22-3	BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C12	50		22-1367		TCA-47		N330L-470			
C13	1000		22-1676							
C14	10000		22-3	BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C15	10000		22-3	BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C16	.004	600	22-448	SI4000	D6-402	CUB6D4	GP2-333-402	PT624	6TM-D4	
C17	2200		22-18	SI2200	D6-222	TP57	811-0022	UC-5222	5HK-D22	
C18	10000		22-3	BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C19	25		22-1887	SI25	D6-250	TP25	GP1K-220	UC-5422	5GA-Q25	
C20	10000		22-3	BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C21	1000		22-17	BPD-001	DD-102	K069	801-001	DC521	5HK-D1	
C22	120	500		NPO-SI120	TCZ-121	5R5T12	NPO-333-121		MS-312	Note 1
C23	10000		22-3	BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C24	470		22-6	BPD-00047	DD-471	K060	811-471	UC-5347	5GA-T47	
C25	4700		22-4	BPD-0047	DD-472	K079	811-0047	DC525	5HK-D47	
C26	.05	200	22-1158	BPD-05	DF-503	CUB2S5		PT415	2TM-S5	
C27	10000		22-3	BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C28	10000		22-3	BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C29	10000		22-3	BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C30	10000		22-3	BPD-01	DD-103	K082	811-01	DC511	5HK-S1	
C31A	4700		22-2567	BPD-2X0047	DD2-502	DK079	811-0047	DC525	5HK-2D47	
C31B	4700						811-0047	DC525		

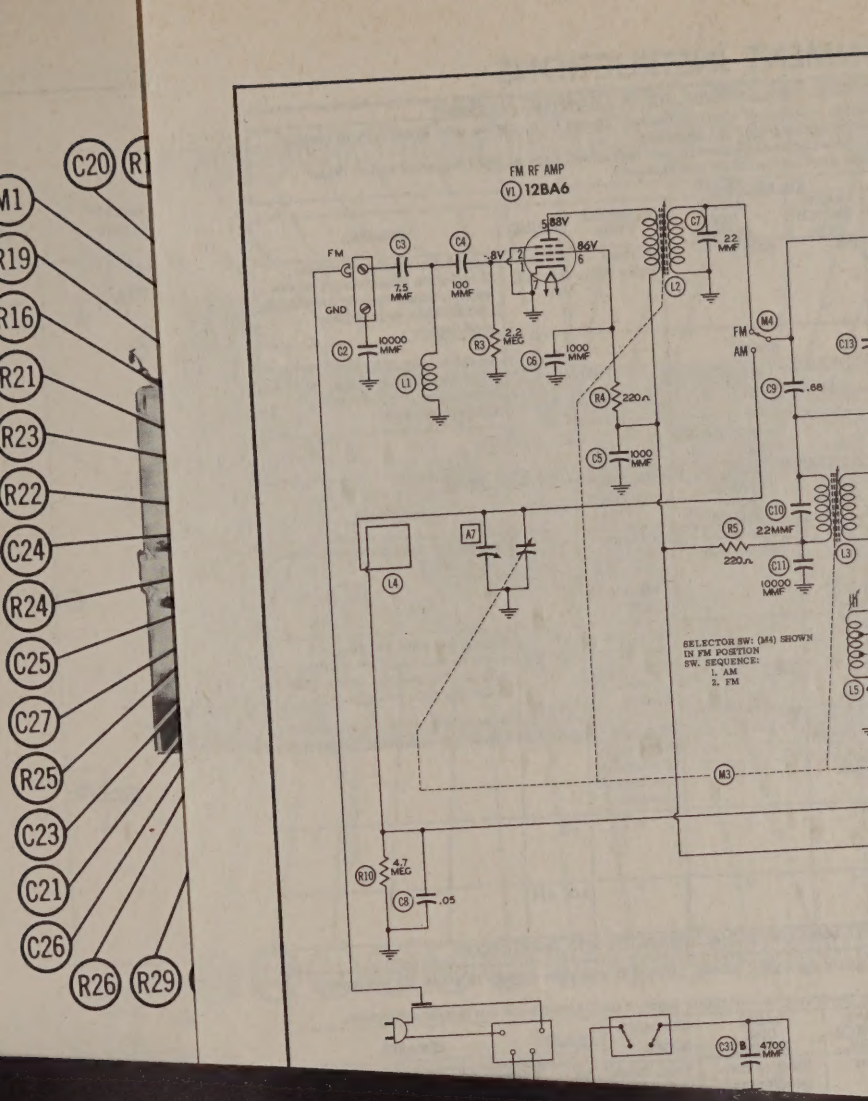
Note 1. Some versions may use 100MMF in this application (Part No. 22-5).

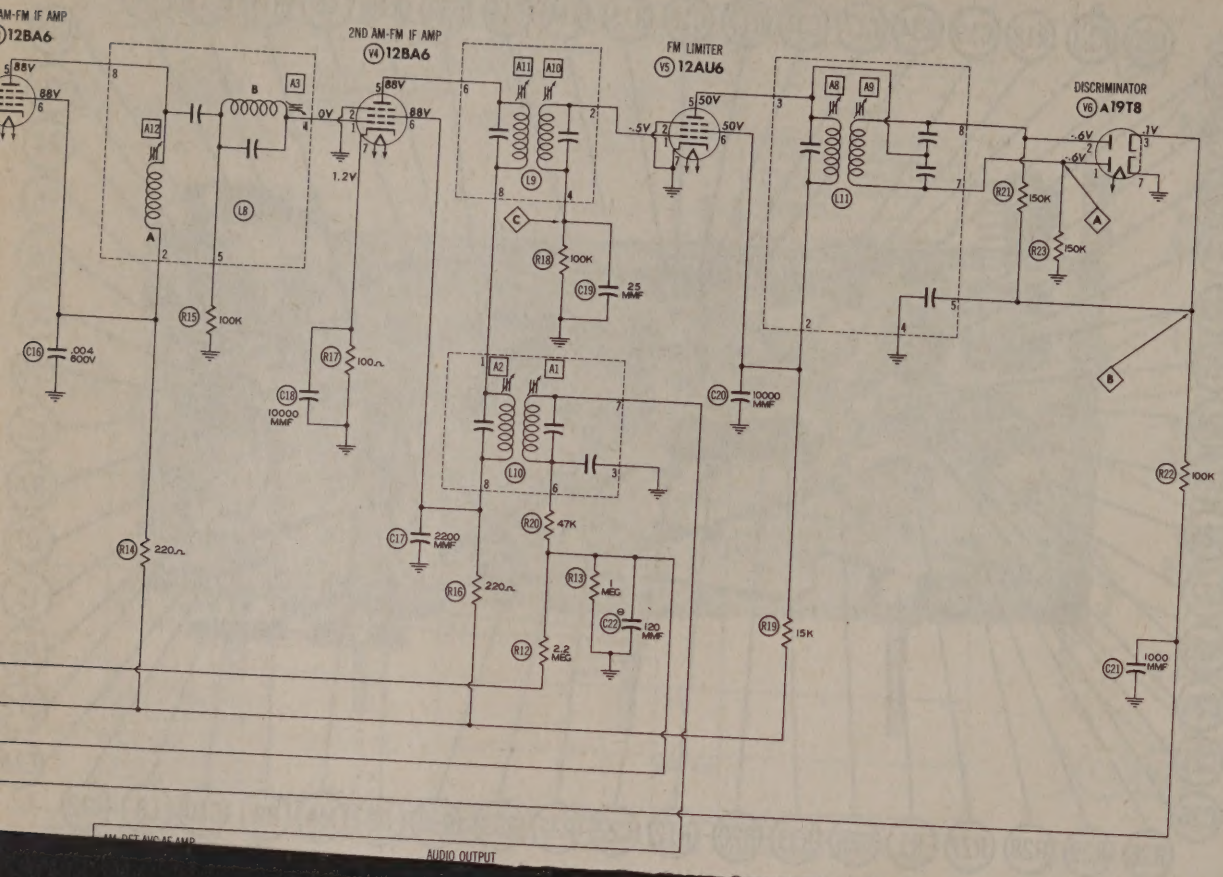
CONTROLS

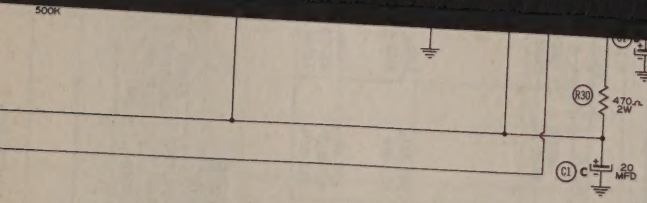
ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ZENITH PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	1Meg	½	63-2798	AB-70	A47-1Meg -Z	Q13-137	U-53	Volume
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R1A
R2A	500K	½	63-2144	AB-617	A47-500K-S	Q11-133	U-50	Tone
B	Shaft		Not Req.	AK-4	FKS-1/4	Not Req.	Not Req.	Attach to R2A

TOP VIEW




FM RF AMP
V1 12BA6
5 88V
7 .8V
2
1
6 86V
FM
GND
C3 7.5 MMF
C4 100 MMF
C2 10000 MMF
L1
R3 2.2 MEG
C6 1000 MMF
R4 220Ω
C5 1000 MMF
C7 2.2 MMF
L2
M4
FM
AM
C13
C9 .68
C10 22MMF
R5 220Ω
C11 10000 MMF
L3
L4
A7
L5
SELECTOR SW: (M4) SHOWN IN FM POSITION
SW. SEQUENCE:
1. AM
2. FM
M3
R10 4.7 MEG
C8 .05
C31 B 4700 MMF
C20
R1
M1
R19
R16
R21
R23
R22
C24
R24
C25
C27
R25
C23
C21
C26
R26
R29

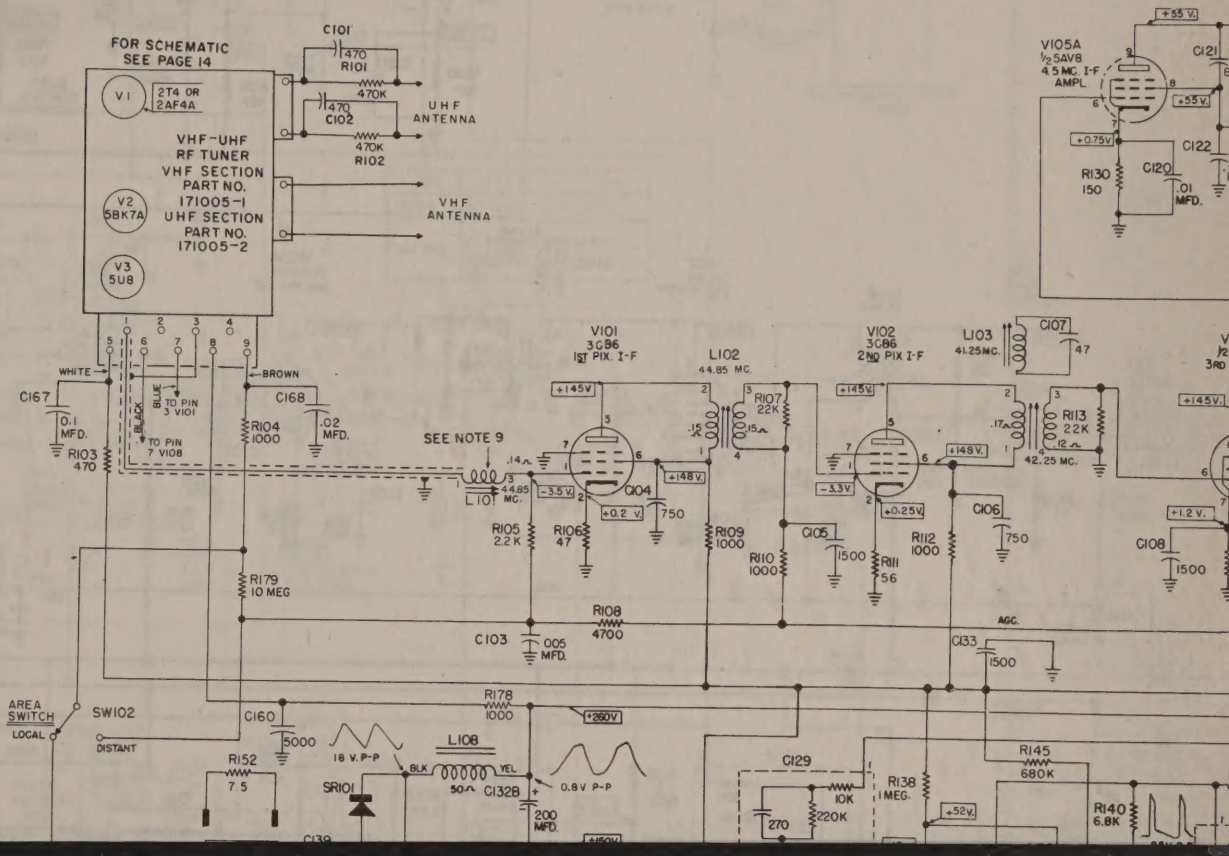


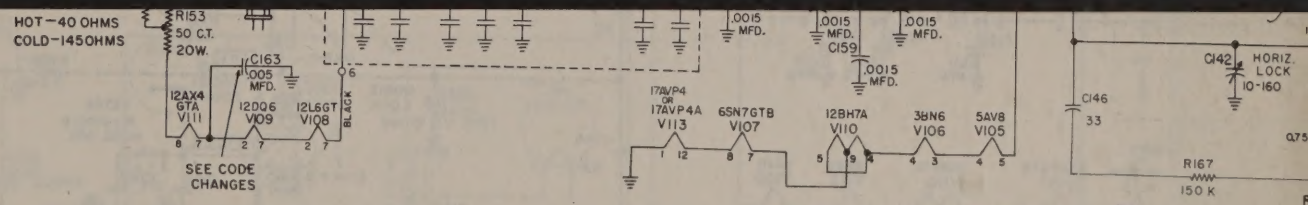


Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12BA6	2. 2Meg	0Ω	79Ω	67Ω	† 1KΩ	† 1. 2KΩ	0Ω		
V 2	12AT7	† 1. 2KΩ	0Ω ■ 3Meg.	2. 2KΩ	67Ω	55Ω	† 1. 2KΩ	10KΩ	0Ω ■ 2Ω	61Ω
V 3	12BA6	2. 3Meg ■ 2Meg	0Ω	55Ω	43Ω	† 1. 2KΩ	† 1. 2KΩ	0Ω		
V 4	12BA6	100KΩ	0Ω	43Ω	31Ω	† 1. 2KΩ	† 1. 2KΩ	100Ω		
V 5	12AU6	100KΩ	0Ω	31Ω	19Ω	† 16KΩ	† 16KΩ	0Ω		
V 6	19T8	150KΩ	150KΩ	200KΩ	0Ω	19Ω	1Meg ■ 547KΩ	0Ω	4. 7Meg	† 471KΩ
V 7	35C5	150Ω	470KΩ	79Ω	114Ω	470KΩ	† 1KΩ	† 300Ω		

RESISTANCE READINGS

ALL MEASUREMENTS TAKEN WITH SELECTOR SWITCH IN FM POSITION UNLESS DESIGNATED. CLOCK DISCONNECTED
† MEASURED FROM OUTPUT OF MI.
■ MEASURED IN AM POSITION.





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DENVER, COLORADO

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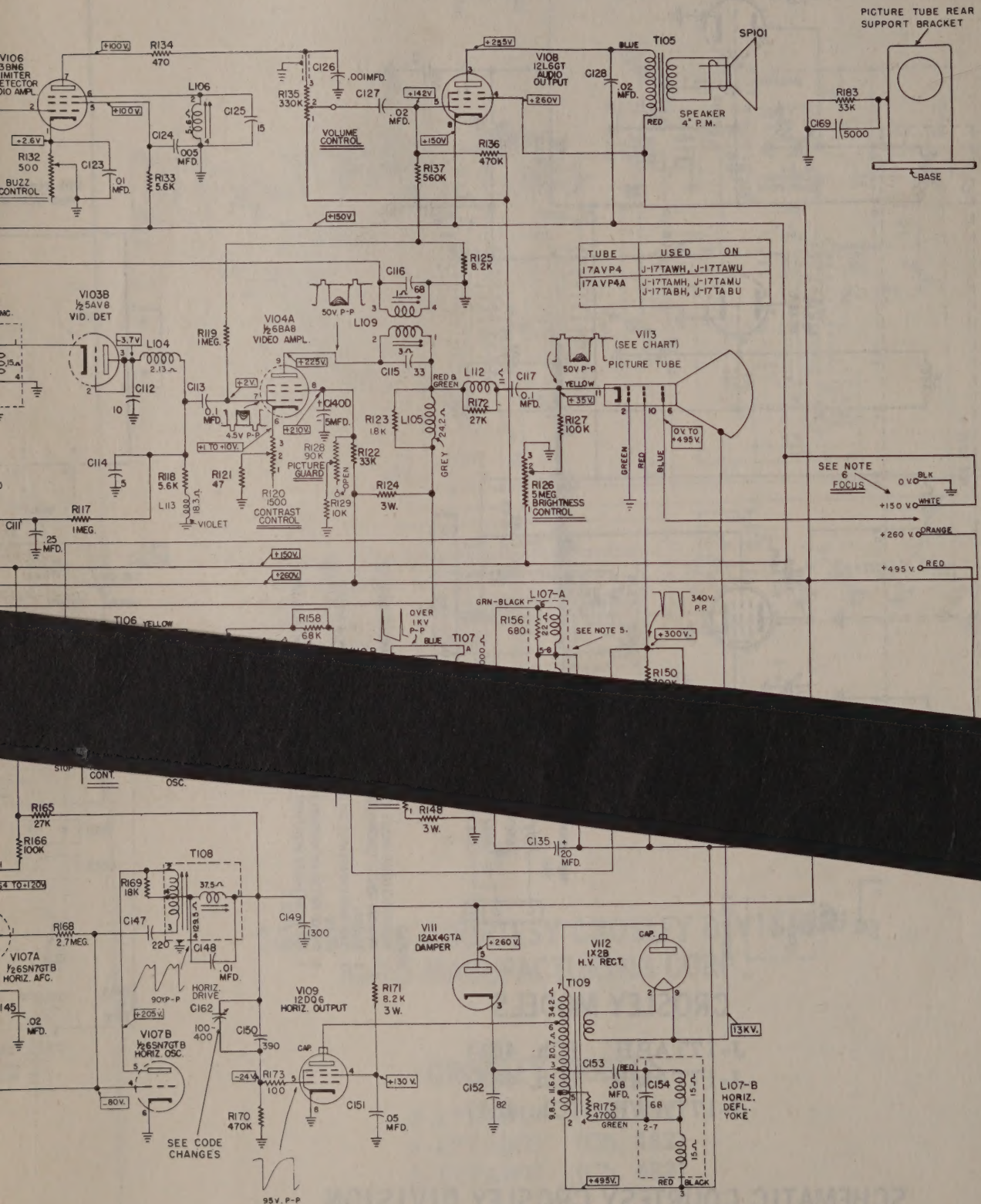
PICTURE TUBE REAR SUPPORT BRACKET
R183 33K
C169 5000
BASE
SP101
SPEAKER 4" P.M.
T105
V108 12L6GT AUDIO OUTPUT
C128 .02 MFD.
BLUE
RED
+260V
+242V
+142V
+150V
+100V
R134 470
C126 .001MFD.
R135 330K
VOLUME CONTROL
C127 .02 MFD.
R136 470K
R137 560K
L106
C125 15
C124 .005 MFD
R133 5.6K
C123 .01 MFD.
R132 500 BUZZ CONTROL
+2.6V
V106 6BN6 LIMITER DETECTOR AMPL.
TUBE | USED ON
17AVP4 | J-17TAWH, J-17TAWU
17AVP4A | J-17TAMH, J-17TAMU J-17TABH, J-17TABU
V103B ½5AV8 VID. DET
-3.7V
L104 2.13Ω
C112 10
C113 .01 MFD.
V104A ½6BA8 VIDEO AMPL.
+225V
+210V
+2V
+1 TO +10V.
4.5V P-P
R119 1MEG.
L109
C115 33
C116 68
50V P-P
R125 8.2K
C117 .01 MFD.
L112
RED & GREEN
YELLOW
V113 (SEE CHART) PICTURE TUBE
+35V
R127 100K
R172 27K
R123 1.8K
L105 24.2Ω
GREY
R122 33K
R128 90K PICTURE GUARD
OPEN
R129 10K
C400 5MFD.
R120 1500 CONTRAST CONTROL
R121 47
R118 5.6K
L113 18.3Ω
VIOLET
C114 .5
R117 1MEG.
C111 .25 MFD.
R126 5 MEG BRIGHTNESS CONTROL
GREEN
RED
BLUE
0V TO +495V
SEE NOTE 6
FOCUS
0 V
+150 V
+260 V
+495 V
BLK
WHITE
ORANGE
RED
T106 YELLOW
R158 68K
OVER 1KV P-P
BLUE
T107
L107-A
GRN-BLACK
R156 680
SEE NOTE 5.
340V. P.P.
+300V.
R150
STOP
CONT.
OSC.
R165 27K
R166 100K
R148 3W.
C135 20 MFD.
T108
R169 18K
37.5Ω
C147 220
C148 .01 MFD.
C149 1300
R168 2.7MEG.
V107A ½6SN7GTB HORIZ. AFC.
90VP-P
HORIZ. DRIVE
+205V
C162 100-400
C150 390
V107B ½6SN7GTB HORIZ. OSC.
-24V
R173 100
-80V.
R170 470K
SEE CODE CHANGES
95V. P-P
V109 12D06 HORIZ. OUTPUT
CAP.
+130 V.
C151 .05 MFD.
V111 12AX4GTA DAMPER
+260 V.
R171 8.2K 3W.
C152 82
V112 1X2B H.V. RECT.
CAP.
T109
342 A
20.7A-0
13KV.
C153 .08 MFD.
RED
C154 68
15.2Ω
R175 4700
GREEN
2-7
9.8Ω
16.6Ω
L107-B HORIZ. DEFL. YOKE
+495V.
RED
BLACK